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Support for Electric Wires.

The accompanying engraving represents a novel hanger or support for overhead conductors, and is especially adapted to be used in connection with the trolley-wire of the overhead system of electric railways.

In accordance with this invention the trolley-wire hanger or support is made as a clamp, preferably in two pieces or jaws, having suitable curved lugs or ears, which pass under and about the trolley-wire, so that when the pieces or jaws are fastened together, as by screws, the trolley-wire rests upon a firm support and is firmly clamped between the jaws, thereby preventing the trolley-wire from falling at their points of suspension. The hanger or support is provided with a hooked arm or upright adapted to engage a span-wire, and the said hanger is secured in place upon the span-wire, but insulated therefrom by disks of insulating material fastened to the span-wire.

The trolley-wire is firmly clamped between the jaws of the hanger, and is secured positively without the use of solder, and is prevented from falling at the points of suspension. The device is manufactured by L. F. Jordan, of Boston.

The Rhode Island Clam.

FOR THE TWELFTH TIME IT IS SACRIFICED TO MAKE AN ELECTRICAL HOLIDAY.

Every electrical man knew last Saturday, August 23d, would be a perfect day. For was it not the day selected by Eugene F. Phillips for his annual clambake, and had he not so influenced the Clerk of the Weather for 11 years before that the sun shone and the rain came not on that day! And the twelfth clambake had the most carefully selected weather that the clerk had in stock, and over 200 persons, guests of that prince of hosts the president of the American Electrical Works, of Providence, blessed the weather official, enjoyed the unique and generous hospitality dispensed at Vue de l'Eau, and came away with another red letter day added to their list.

A new musical instrument, the "Squawkophone," in which you pull the string and it does all the rest—and what a rest—was discovered at every plate, and when every one of the assembled electrical guests got the instruments to work, the birds of the air paused in their flight, the fishes of the bay came ashore, and the peaceful natives moved over into the adjoining county. The discovery of this valuable musical instrument is said to be the result of recent explorations in darkest Africa, and the legend is that the original use of the "Squawkophone" was as the court musical instrument of King Put-up-a-job-job, and is probably as ancient as the stars to which its music reaches. As the soft hour of twilight falls and the cook announces that the five o'clock tea is ready, Put-up-a-job job takes his golden "Squawkophone" from the carved ivory stand (made from the horn of the sacred white rhinoceros), and draws a long, low, mellow note, at the sound of which each of the king's hundred wives is expected to report at once. The last one to obey the summons is always beheaded. In this way the harmony of court etiquette is maintained at a high standard, and a continual round of new faces is presented to the king. Hence, the "Squawkophone" is symbolical of promptness. A happy addition to home circle amusements, comprising as it does pleasure with proper training, for

"Timely service, like timely gifts, is doubled in value,"

And it was chosen on this occasion to represent the manner in which the American Electrical Works are able to fill all orders for insulated electric wires, Faraday cables, etc."

The games of football and baseball were indulged in until time for the clambake, the score of the latter standing 47 to 53, when the scorer struck, and the game ended in home runs for the dinner table, which was set out on the beautiful lawn under a large tent, where the cool breezes from the bay fanned the fevered and other brows of the hungry and expectant visitors.

The bake was one of the best ever served. The clams were in just the right condition, and all the accompanying dishes fitted in their proper places most delightfully.

At the conclusion of the repast, Mr. Phillips announced Gen. O. E. Madden as the toast-master, who most gracefully filled that position, announcing the following toasts, to which the individuals named responded happily and in excellent wit.

Before calling out the speakers Gen. Madden gave, in a very humorous vein, the authentic history of the origin and growth of this now famous twelve-year old clambake.

First Toast—"Eugene F. Phillips, president of the American Electrical Works—our host and everbody's friend." Responded to by Mr. Geo. S. Bowen.

Second—"The Rhode Island Clam, the juiciest of the juicy, and evidently of ancient origin." By Ex. Sec. of State Hon. J. M. Addeman.

Third—"The Telegraph, the first practical application of electricity," by a modest "old timer," Mr. Suel Smith.

IMPROVED SUPPORT FOR ELECTRIC WIRES.

Fourth—"The Telephone: speechless yet master of all languages"—there is no discount on this or on the rates; will be responded to by one who got in early, Mr. H. L. Storke.

Fifth—"Electric Light and Power—safe, reliable, economical and adapted to all uses except electrocution." By Marsden J. Perry.

Sixth—"The Electrical Press:

To our faults a little blind,
To our virtues ever kind."

Responded to by Mr. T. C. Martin, of the *Electrical Engineer*.

The remarks of all the gentlemen were brief yet entertaining, and what is not always the case attentively listened to by the three large tables of happy electrical workers. Many prominent faces were present, among whom were: H. L. Storke, Fred W. Royce, Gen. O. E. Madden, A. M. Young, F. E. Pettingell, Frank Ridlon, M. J. Perry, A. C. White, E. B. Baker, P. H. Alexander, Capt. Wm. Brophy, J. J. Carty, A. V. Garratt, Frank C. Mason, R. F. Ross, T. C. Martin, Geo. S. Bowers, P. C. Ackerman, Capt. Cushing, J. R. Magee, W. J. Morrison, Albert Phenis, Geo. W. Adams, W. J. Denver, Col. Gardiner C. Sims, C. E. Stump, W. G. Sellers, Chas. W. Price, J. C. Wilson.

On returning to Providence in the early evening, a large number of electrical visitors under the guidance of President Perry visited the new station of the Narragansett Electric Light Company, and had the pleasure of seeing a station erected on a broad and comprehensive plan, where ample provision for future growth, so necessary in this branch of the business, had been provided for. Over $500,000 has been spent recently by this company in extending its plant, and to-day the stock of the company sells away above par, yet none of it is for sale.

The evening trains and boats took away a happy crowd, all voting Mr. Phillips, what he undoubtedly is, a prince of hosts.

Manufacturing and Central Station Companies.

The following is the report made at the Cape May Electric Light Convention by the committee appointed to consider the relation between manufacturing and central station companies:

"The vast sums of money invested now as capital in the United States in the various electric light and power companies, makes the subject with which this committee has to deal more than ordinarily important.

From every point of view the policy that has been more or less surreptitiously pursued by parent companies in *permitting* their agencies, for the sake of a present sale of apparatus, to foster and encourage improper and hurtful competition with present central station companies, cannot in our judgment be too strongly condemned by this Association.

Capital has been induced, in spite of its proverbial timidity, to invest in what has been an unexplored field. Often this investment has been brought about by the parent companies themselves. Then when it has seemed as if the stormy days of doubtful experiment were about over, and there was some little possibility that this investment might begin to make returns, along comes the agent of some parent company and by specious representations induces other citizens of the same place to start a new plant, always forgetting to tell of the weary journey of the pioneer company, and pointing always to present position. The only province of this new plant is to damage and destroy what did give some promise of life and fruit, and incidentally to make a market for a little new apparatus, effectually closing, however, a profitable avenue of steady continuing business in sales to the original companies.

It is rumored very strongly, and indeed stated as a fact, as strange as it may seem, that parent companies, not satisfied with permitting, have gone so far as to actually organize central station companies in competition with others which are abundantly able to supply all demand, strengthening, supporting and sustaining them in their unholy warfare against legitimate enterprise.

Such being the case, your committee would earnestly recommend either its continuance or the appointment of a new committee with power to confer and advise with any companies against whom such warfare is waged, and that through such committee the members of this Association, as central station companies, pledge sympathy, assistance and protection to any company so being fought; and that such committee be instructed to represent to the various parent companies that the conduct we have above deprecated is something so fatally injurious to us and to our stockholders as to make our investments uncertain and undesirable, and that therefore we will as one Association feel not only justified in but required to take the strongest possible means of remedy and prevention within our power whenever we find a parent company engaging in or permitting such a course of conduct. When it has already been started any such company so minded can readily stop it.

MARDSEN J. PERRY, *Chairman*."

THE CAPE MAY CONVENTION.

The Electric Light Men take in the Sea Air and Discuss Electrical Topics.

PAPERS BY PROF. HENRY MORTON, H. L. LUFKIN, H. M. SWETLAND AND OTHERS.

PROVIDENCE THE PLACE SELECTED FOR THE FEBRUARY MEETING.—A NEW CONSTITUTION ADOPTED.

TUESDAY, AUGUST 19TH.

OPENING OF CONVENTION.

The ballroom of the Stockton Hotel was one-fourth filled with members and their wives when, at 10:40 A.M., President Marsden J. Perry called the Twelfth Convention of the National Electric Light Association to order, and proceeded to read his opening address:

INAUGURAL ADDRESS.—BY MARSDEN J. PERRY, PRESIDENT.

Members of the National Electric Light Association:

You are here to-day to erect, by mutual action, another mile-stone—in the form of the volume that will be created to contain a record of your proceedings—to mark the progress of the development of the electrical industries. Short as the history of this development is, it has been so crowded and broadened by the eager enterprise that is characteristic of our people, that no records are to-day sufficiently ample and complete to give any of us a correct knowledge of the present condition of the multitude of undertakings employing electricity in some form of practical application.

To supply this deficiency, a "Memorial and Statement" has been presented to Congress in the name of this Association, urging that the fullest possible investigation and report be made on the electrical industries by the Eleventh Census. This Association can do no more important work for the interests it represents than to select from the census reports certain points of inquiry, and adopt measures to keep them continuously written up to date. A recommendation looking to this end may be presented by the committee on data.

As a general statement it may be assumed that there is to-day a central lighting and power station in operation in every town of any importance in the United States. An estimate made by and published in the August number of *Electrical Industries* makes the following showing:

Number of stations	1,379
Capital invested	$118,758,500
Number of arc lights	127,441
Number of incandescent lights	1,590,967
Engine capacity, horse-power	336,735

Eloquent as these figures are of enterprise and progress, they tell but part of the story. One startling omission is that of the electrical transmission of power for stationary and locomotive work. The statements however may serve the purpose of helping the imagination to picture the results that are to be shown by the census of the century in the year 1900.

It is a safe assertion that there is not a station in this country with a present capacity sufficient to satisfy one-twentieth of the demand for light and power that exists

within the area of its practical working limits. To reach the consummation of ultimately doing the entire lighting and power service that is to-day being supplied by the use of agents other than electricity, is an undertaking worthy of the united efforts of all who are interested in the electrical industry. The foundation of such a growth must be laid in an unquestioned demonstration that investments in central stations for supplying light and power by the use of electrical currents are safe and profitable, that the service is in comparison with that rendered by other agents used for similiar purposes a protection to life and property, and that the service can be employed with advantage in economy, health and comfort, by all users that cannot be realized by the use of any other agent.

Those who know best what is required to meet all issues and to establish a business involving the complex factors and conditions assembled in undertakings for central station work, are those who have invested their money in it and are employed daily in its management. To them and their interests, which includes that of all who manufacture apparatus and supplies, as surely as the greater comprehends the lesser, this Association is pledged for well considered and effective work.

In your deliberations and discussions you have an opportunity to show your thorough knowledge of the subjects in which you are interested. By your actions you can prove yourselves masters of the factors that induce progress and invariably lead to successful issues.

The Twelfth Convention of The National Electric Light Association is now open for the consideration of such subjects and business as may come before it.

The Secretary, Mr. Allen R. Foote, then announced that the Executive Committee had appointed a committee of three on credentials, consisting of Messrs. E. R. Weeks, chairman, M. J. Francisco and John A. Seely.

The Executive Committee also recommended the appointment of a Committee on Resolutions, to take the names of those desiring to discuss any topics which came up in the course of the Convention, except during the last or executive session. The members desiring to take part in any discussion were requested to hand their names to the Secretary before the discussion was started.

Mr. C. R. Faben, of Toledo, moved that this recommendation be adopted, and that the Chair appoint such a committee. Seconded and passed.

President Perry appointed the following as a Committee on Resolutions: Dr. A. F. Mason, C. H. Wilmerding and C. R. Huntley.

Prof. J. P. Barrett, of Chicago, who was to read a paper on the "Electrical Industries and the World's Fair," announced that he was suffering from a severe cold, and stated that Mr. John W. Blaisdell, of Chicago, would read the address for him.

The following is Prof. Barrett's paper:

"ELECTRICAL INDUSTRIES AND THE WORLD'S FAIR."

It has been stated by competent authority that had it not been for the exhibition of the speaking telephone at the Centennial Exhibition at Philadelphia, the telephone would have been ten years later in receiving popular recognition and becoming a success. It is well known that the individuals who were nearest the telephone invention looked upon it with distrust, considered it a toy and an invention of no great practical importance. But Sir William Thompson, who was in 1876, as he is now, the recognized authority in electrical science, seeing the telephone at the Centennial Exhibition, became enthusiastic over it, and endorsed it so warmly that it directed public attention to the invention and made it an immediate success.

Great as are the interests resulting from the telephone, which was first publicly exhibited at the Centennial Exhibition, at Philadelphia, the importance of this invention extends beyond the particular interests directly concerned. The public attention attracted by the telephone has stimulated activity in electrical industries which warrants the statement that the exhibition of the telephone marked a new era in electrical progress. The telephone and the relation of the Centennial Exhibition to the promotion of its popular success, is mentioned simply as an illustration of the importance of the World's Fair to electrical enterprises. Fourteen years have passed since then, and in three years more the Columbian Exposition in Chicago will be looked on to exhibit the progress which has been made since that date, and to be commensurate with an industry so progressive as to have absorbed an investment of $500,000,000 in the past 10 years. It is not unreasonable to say that there will be more interest in the development of electrical science, and in the evolution of the art of electricity as applied to various industries, than in any other branch of the World's Fair. The rivalry in invention has led the United States to outstrip all other nations in the practical application of electricity. Thus it was that the electrical department of the United States Exhibition at the Paris Exposition saved the United States from complete disgrace, and yet the electrical department of the Paris Exposition was the weakest feature of the entire show. Probably the United States in the Columbian Exposition cannot hope to equal Paris in the matter of its general exposition, but in machinery and electrical matters particularly we should do a great deal better.

The most striking failure of electricity to play its proper part at the Paris Exposition was exemplified by the Eiffel Tower, which was not only not lighted by electricity, but even had its numberless gas jets lighted by hand, after the old-fashioned way. Then the general lighting of the show was not made a feature, but only a very subordinate affair. The only place where electric lighting can be said to have been a feature was in the working of the colored fountains, an English invention and already rather old, but a fine thing and worth repeating at Chicago, with better facilities for spectators. The next most striking lack of the Paris Exposition was in the matter of electric street railways. It would seem that an exposition in these days should have an organized system of electrical locomotion for carrying a lot of passengers quickly and cheaply from side to side and from end to end of the entire grounds. Paris had a steam dummy going around two sides of the ground, but that was insufficient, and the cars were usually crowded just when people wanted to use them. That, however, was on account of the exposition being such an unexpected and tremendouos success. The only means of electrical locomotion used at Paris was an electric crane running from end to end of the machinery building, very slowly, to give people a chance to see the various exhibits from above, and incidentally some rest and some air.

There was also no organized telephone exchange system at Paris. Considering that the Melbourne Exhibition of 1880 had a telephone exchange in full operation inside the grounds, doing substantial service to exhibitors, as well as to the officers of the exhibition itself, Paris is to be pronounced behindhand in this respect. There was something done in the American section at Paris for the officers of that section and for some exhibitors, but it was not very well done, and was on a very small scale. There may have been other similar telephone exchanges at work, but there was no good general system for everybody and in connection with the city.

It is the intention in the following paper to point out some lines in which the exhibition of that branch of industry in which we are all interested should be protected and promoted according to the brief consideration which the writer of this paper has been enabled to give the subject.

In the first place, electricity will find numerous applications in the way of actual service in carrying out the plan of the Exposition. By this I refer to the fire alarm protection signalling apparatus, electric lighting, both arc and incandescent, transmission of power, telephoning and telegraphing. The location of the main Exposition having been rightfully settled in favor of the lake front, which is practically in the heart of the city of Chicago, and within five squares of the telephone central office, the fire alarm central office and the Western Union and Postal Telegraph offices, it will be a matter of no serious difficulty to make such connections with the general city electrical service as will give the Exposition the benefit not only of its own special outfit in each of these directions, but also the advantage of its outside connections. Aside from this application of electricity to the utility and necessities of the Exposition, the features in which we are all particularly interested are those which illustrate the progress that has been made in the science and in the art. The success that has attended recent electrical exhibitions, such as the one in Philadelphia in '85, and the one in the American Institute Fair in New York, give us some idea of what can be accomplished in this direction with the immense multiplied facilities at the World's Fair in Chicago, and with the incentive to manufacturers and inventors which comes from having the attention of the whole world directed to their work.

With reference to telephones, as is generally known, the fundamental patent on the telephone will expire in 1893, and we may expect not only the inventions accumulated and hoarded by the American Bell Telephone Company for the years that they have had control of the business to be exhibited at the World's Fair, but also numerous other inventions which will be stimulated by the opening of the field to competition. Thus, this feature should be given a much greater consideration, and more attention should be paid to it than in any other previous exhibition. We have seen only the beginning of the growth of the telephone business. This is shown by the fact that in the city of Berlin there are now 13,500 subscribers, and the exchange there is growing at the rate of 3,500 per year. I predict that in the city of Chicago inside of 10 years there will be 30,000 telephones in use. Such a great increase in the use of telephones calls for apparatus and appliances, the invention of which will tax the best talent of the country for years to come. Of course, in addition to the historical exhibition and the exhibition of recent inventions in telephones and apparatus applied to telephony, there will be immense numbers of telephones used in and about the buildings of the Exposition.

The matter of telegraphy also should receive its due share of attention. The different forms of quadruplex, the use of dynamos for furnishing the current instead of batteries, and other inventions in which the recent history of the telegraph is prolific, should each and all be suitably presented. Police and fire alarm apparatus of the latest design and the best manufacture, together with all appurtenances, will attract a large share of attention.

The telautograph, which by 1893 will undoubtedly be a practical success, even if it shall not have ceased to be a novelty, will also come in for purposes of exhibition as well as for extensive practical use.

Motors for driving machinery, furnishing power for various purposes, running street cars, etc., will perhaps be even of more practical benefit than any other application of electricity; while electric lighting apparatus of various kinds will take the lead undoubtedly, as it now does, over all other electrical industries.

It is proposed to connect the two parts of the World's Fair, one situated on the Lake Front and the other at Jackson Park, by means of a railroad built out on the lake. The expediency of adopting electricity for motive power on this railroad is at once obvious. Thus the two features of usefulness and exhibition can be readily combined, and in addition to the direct transmission of power, storage batteries could be employed for traction purposes on this road.

It is difficult in enumerating the different departments of electrical enterprise to foresee all of them, and particularly to foretell the relative importance of the different ones three years from the present time. In no field of human activity is invention so active and enterprise so energetic, and when we speak of the different forms of application of this science which are well known at the present day, we all know that we are simply on the threshold of future developments which may be confidently expected. No time in the history of the world has there been so great activity in any given direction as there now is in the department which we represent, and too much cannot be said with reference to the importance of having adequate facilities in the coming World's Fair to display the various industrial and artistic applications of electricity.

What will be exhibited at the World's Fair will undoubtedly be a revelation to the visitors. It should be the aim of the people having the exhibition in charge, to so organize and classify the exhibits as to present clearly and forcibly the progress of the art and the present state of the art in its various departments. A chaotic exhibition of the products of the different manufacturers would accomplish something in the way of creating astonishment and mystifying the beholder. This is not what is desired. It is desired that the World's Fair as a whole, and the electrical exhibition as perhaps the most important industrial feature of the exhibition, be made an education. It is not too early now to lay plans for the proper presentment of electrical industries for this great exhibition of 1893. The combined intelligence of the men who are to-day pushing forward electrical enterprises, working in harmony, will be able to accomplish great results, results which will surprise all of us. But the element of time must enter into all calculations; especially is this the case with a subject so large and so involved as the suitable presentation to the public of the rapidly growing electrical enterprises in their various fields.

The Exposition should be made just what its name implies, a practical exposition of the progress and advances made in the several branches of the science of electricity, and the exhibits should be so arranged that the various improvements may be seen and be appreciated at a glance. Thus will the real object of the Exposition be accomplished and a saving of much valuable time to the visitor be effected. For it is quite probable that fully 50 per cent. of the visitors to the electrical section will go there with the earnest desire to become thoroughly familiar by practical observation and study with all that has been done in some certain industry, either to aid in carrying on a certain line of study or with a view to select what they may there conclude is the apparatus best adapted to their needs. In either case time will be an important and valuable factor, and how to enable each visitor to quickly and understandingly grasp the more important details and points of superiority of any exhibit should be the main object of the respective exhibitors.

The usual method followed in the small expositions has been to allot a certain space to each exhibitor, and allow him to place therein whatever he may desire to bring to the notice of the visitor. This is a good plan, and one which proves economical in many ways to the exhibitor. Another plan would be to allot space for the various types of apparatus, irrespective of the main display of the exhibitor. That is, to place all telephone apparatus and everything thereto pertaining in close proximity; the same with telegraphic apparatus, arc lighting dynamos, incandescent machines, motors, etc. The carrying out of such a plan will, of course, give two or more separate exhibits to each manufacturer, and thus entail some slight additional expense, both in the matter of suitable furniture, and possibly in the matter of attendance; but all this additional outlay would be more than returned in the excellent results attained, and in the simplifying of the study of any particular type of apparatus, to say nothing of the greater publicity given each exhibit. Of course there would be no objection to an exhibitor reproducing a complete display of all his wares in the space allotted to him for his headquarters, irrespective of the fact that many articles may also be shown in the respective space to which they belong.

As far as possible a complete specimen of every article and every size should be placed on exhibition. For instance, in the line of motors, there should be one of each size from the smallest to the largest turned out; and so with dynamos, batteries, etc. In the space alloted to the display of testing instruments the showcases should be placed on a flooring above a foundation made sufficiently solid to prevent oscillation of the needle, or injury to the more delicate parts from vibration or other similar cause. Every article should have a neatly printed card attached, of size uniform in proportion to the character of the object displayed, containing the name of the article, the manufacturer's address, and a brief description of its intended use, the same appearing in English, French, German and Spanish.

At the present time there are about 430 separate companies or individuals whom we can expect to apply for space, many of whom will have but a single article or two to exhibit. But every one of this number will probably defer action until the last possible moment, unless the importance of securing the necessary space and having his exhibit in readiness within the appointed time is impressed upon him. Some of the manufacturers will have to be coaxed into making exhibits, while others will hesitate on account of the expense entailed. The chief or his secretary must attend to all of this, and must spare no pains to secure not only an exhibit but the *best exhibit* possible for each manufacturer to make.

Great assistance in carrying out a comprehensive and systematic plan for the Exposition may be looked for in the United States Census, the report of the electrical department of which is looked for with great interest.

After Prof. Barrett's paper was finished, Mr. C. R. Faben, of Toledo, Ohio, remarked upon the pleasure he had derived from listening to it, and stated that there would be no part of the World's Fair which would interest the present audience so much as the electrical department. He therefore urged that the central station men get together promptly and arrange to make their part of the exhibition as complete as possible. He also urged that Prof. J. P. Barrett, of Chicago, receive the endorsement of the National Electric Light Association as electrician of the World's Fair. Mr. Faben then made a motion, that a committee of five consisting of the President, ex-officio, and four others named by the chair, be appointed to take charge of the affairs of the National Electric Light Association for the World's Fair, and to endorse Prof. Barrett as electrician.

The motion was seconded by Mr. Geo. M. Phelps, of New York, who heartily endorsed both parts of the motion.

Judge Armstrong, of Camden, N. J., was in favor of all of the motion as presented except where it proposed to endorse any one individual for the position of electrician. He thought the National Electric Light Association ought to maintain and uphold the non-partisan and unbiassed position which it had heretofore occupied. While he was personally in favor of Prof. Barrett for

the position, and would do all he could individually towards accomplishing that end, he was not in favor of the National Electric Light Association endorsing Prof. Barrett or any one else for the position.

Mr. P. H. Alexander, of New York, thought the Convention ought to be more deliberate in its actions than it had been heretofore, and moved to table the motion.

Mr. Fred Degenhardt, of Chicago, thought he would be unfair to Chicago and untrue to Prof. Barrett did he not urge the Association's endorsement of that gentleman as an absolutely neutral man, and, therefore, eminently competent to assume the office.

Ex-President S. A. Duncan, of Pittsburgh was of opinion that this matter ought to have been referred to the Committee on Resolutions, which had been appointed a short time previously.

Mr. A. J. DeCamp, of Philadelphia, did not agree with Mr. Duncan in this.

Mr. Alexander thought that Mr. Duncan's suggestion would have the same object as his motion to table the previous motion, namely, to gain time.

Judge Armstrong called for a division of the original motion, and moved to amend by simply referring it to the Committee on Resolutions.

When put to a vote by the Chairman, the motion as originally presented by Mr. Faben and seconded by Mr. Phelps was carried.

The next matter in the order of business was the report of the Committee on Copper Tariff. This committee consisted of Messrs. Charles A. Brown, chairman; George M. Phelps and J. F. Morrison. The report was made in a verbal form by Mr. Brown, as chairman, and he supposed that all present were familiar with the tariff bill now before Congress. If this bill becomes a law the duty on copper will be reduced at least 50 per cent. The committee had received over 500 requests asking them to urge on the reduction of the tariff. They had mailed over 1,000 letters bearing upon the subject, besides doing considerable work individually. Mr. Phelps had gone to Washington with a petition for signatures, and had personally appeared before the Ways and Means Committee in behalf of the bill. No appropriation had been made by the Association for expenses incurred by the committee, and the members of the committee had advanced money for such purposes to the amount of $110.

Mr. DeCamp moved that the report be accepted and the committee continued.

Mr. Alexander moved that the treasurer of the Association be instructed to reimburse the committee in the amount named for expenses.

Both motions were seconded and carried.

The Chairman read a notice requesting the Reception Committee to meet at 2 P. M., at the headquarters of the ELECTRICAL REVIEW, in Parlor C.

Mr. DeCamp offered a resolution to reconsider the action in appointing a Committee on Resolutions.

Mr. Faben asked to have the amendment re read.

On the call of the Chairman for topics for discussion, the following was suggested: "Proposed Classification of Lighting Power of Incandescent Lamps," discussion to be opened by Dr. Louis Bell, of New York City.

At 11.45 Mr. Alexander moved to adjourn the morning session. Seconded and carried.

AFTERNOON SESSION.

The afternoon session of the Convention opened at 4.10 o'clock, with a fair attendance.

President Perry read a telegram of regret from Mr. M. D. Law, of Denver, Col. Then followed a five-minute talk by Mr. David Brooks, of Philadelphia, on "Liquid Insulation for Underground Conductors Carrying Currents of High Voltage." The speaker mentioned the new methods of testing cables employed in Paris and London, and the differences obtained when testing with a current from an induction coil or Holtz machine and when using a regular current of high voltage. The five minutes expired before Mr. Brooks had finished his interesting remarks.

The next paper on the programme was that by Professor Morton, of Stevens Institute of Technology, on "Dangers From Electricity."

"THE DANGERS OF ELECTRICITY."

When the development of electric currents, on a large scale and at a small cost, first became possible by reason of the discoveries of Faraday, Wilde, Gramme, Siemens and others, the question of the dangers to life and property attending their use was brought prominently before the public, just as the dangers attending the use of steam, of rapid locomotion on railroads, and of dynamite were brought to the attention of the world when these powerful agencies first left the experimental laboratory of the chemist or engineer to take their part in the ordinary labor and business of life.

In each instance alike there was a class of people who took the narrow and partial view, that if an agency was dangerous it should be excluded altogether from public use, or, what amounted to the same thing, be surrounded with such exclusions and limitations as would rob it of nearly all its capacity for usefulness, and restrict all possibility of advance and development in its application.

Thus laws were actually passed in England on the first introduction of steam limiting the pressure in boilers to 30 lbs. on the square inch.

The first railroad charter contained a clause limiting the speed of trains to 12 miles an hour, and when a speed of 30 miles was suggested, it was ridiculed in a prominent journal of the day as an idea simply insane, and it was said that people would just as soon be persuaded to allow themselves to be fired out of cannon as to be hurled along at such fearful velocities, which would, without doubt, have the most disastrous effects upon the circulation of the blood and other vital actions.

Some of us can also recollect the excitement produced and echoed in the press on the introduction of dynamite, and the stringent laws regarding its transportation, which in many cases only increased the danger to the public by occasioning its surreptitious conveyance in passenger and ordinary baggage cars.

We shall have to be very young indeed not to remember the great popular excitement brought about by the daily press when electric lighting first appeared in the streets of New York, and when flashes of flame were described as proceeding from a horse that had run against an electric wire.

In all the older instances matters have settled themselves in accordance with the laws of human progress and the diffusion of intelligence, and we now have boilers running at pressures of 140 pounds and upwards, trains going more than a mile a minute, and gunpowder largely superseded by dynamite.

What is more, the accidents and injuries actually produced by these several agencies have been vastly less than those caused by the things which they replaced.

A much smaller number of people are killed or injured by high pressure boilers than by low pressure ones. How rarely do we hear of the explosion of locomotive boilers, which usually carry 140 pounds pressure?

The accidents to express trains are as nothing compared to those occurring with freight trains, and the loss of life and injury to passengers by rail is insignificant in its percentage to the number carried, when compared to similar loss and injury incurred in the days of stage coaches.

The same relation has been found between dynamite and gunpowder, the former having largely reduced the proportion of accidents and injuries as compared with the work done.

Two lessons are very plainly taught by the facts of history above alluded to.

First: The world is not going to be frightened away from a new and valuable source of power by the circumstance inseparable from the very nature of all powerful agencies, that it is dangerous if not adequately controlled; but, on the contrary, will develop the new power to an ever increasing and, therefore, more (possibly) dangerous intensity.

Second: Intelligently managed and controlled, the most powerful and, therefore, in a sense, dangerous agencies, become the most efficient protectors and servants of man, and not only aid him in his mission of subduing and utilizing nature, but actually protect him in his work.

Without these "dangerous" agencies man would be reduced to the lowest condition of savagery, where he would be at all times helplessly at the mercy of the "elements" or the blind forces of nature.

With them he not only defies and subdues the beasts which would otherwise be his superiors, but even conquers and renders tributary to his comfort and advancement those vast forces which control the entire matter of the Universe.

Applying these lessons taught by the past history of the world in parallel cases to the problem of the distribution and use of electricity, we see in the first place that the way to deal with its dangers ought not to be the timid, obsolete way of prohibition, or of unintelligent restriction, such as that which proposed the exclusion of locomotives from railroads, or the limiting of their speed to 12 miles an hour, but the sensible way of providing adequate safeguards to the new power, and with these allowing it to follow its natural line of development and growth into higher and higher ranges of intensity and consequent efficiency.

It is too well known to all to need statement, that the methods thus pointed out by history and taught by experience have not been by any means universally advocated or followed, and that while many have loudly demanded the exclusion of powerful electric currents, the limitation of their intensity to what they suppose to be necessarily harmless ranges, the users of such electric currents have in too many cases neglected the most obvious precautions.

It is only fair to say, in explanation of this latter statement, that this neglect has in many cases been brought about by obstructions thrown in the way of good work by those who were exciting themselves for the total abolition of dangerous currents, and who, like certain "total abstinence" advocates, objected to every mitigation of evil they attacked, because any such improvement weakened their case against it.

As regards dangers to property from fires, the matter fortunately fell at an early period into the hands of the Board of Fire Underwriters, who, in a judicious and business-like way, investigated the subject and formulated such rules as have proved eminently satisfactory, and have proved that under proper regulations as to good work and means of protection, electricity is by far the safest means known to us for the distributing and development of light, so far as "fire risks" are concerned.

In view of the satisfactory results thus obtained I regard it as a fortunate circumstance that the other part of the problem, namely, that relating to dangers to human life, has been recently taken in hand by a similar organization known as the "Employers' Liability Assurance Corporation."

This association, after collecting a mass of material from a great variety of sources, has some time since formulated a series of rules for the protection of those employed in erecting and operating electric apparatus involving the use of powerful, and, therefore, dangerous currents. These rules have been examined and approved by several of the managers of prominent electric companies, and so far it would appear as if no accidents have resulted from the use of electric currents where these rules have been followed, and that most if not all the accidents which have occurred would have been prevented had these rules been followed and obeyed.

Having had something to do with the framing of these rules, it is my chief object in presenting the present paper to secure their criticism by those best able to perceive their imperfections, and such suggestions as may lead to their beneficial modification or extension.

I therefore quote them as follows;

First. Do not touch or handle any electric wire or apparatus of any sort while standing on the ground, or while in contact with any iron work, gas or water pipe, or stone or brick work, unless your hands are covered with rubber gloves, and you are provided with such properly insulated tools as have been declared to be safe and in good order by the electrician or other competent officer of this company.

If it is at any time necessary to stand on the ground, or on any surface not insulated from the ground, while handling electric wires and apparatus, rubber boots or an insulated stool should be used.

In moving wires, hanging on or lying over electric light wires, lamps or fixtures, use a dry hand line.

Second. Never handle any electric wire or apparatus with both hands at once when this can be avoided, and, if it is necessary to do so, be sure that no current is present, or that one or both hands are protected by rubber gloves or other efficient insulation.

Third. When handling line wires, treat each and every wire as if it carried a dangerous current, and under no circumstances allow yourself to make contact between two or more wires at the same time.

Fourth. Never open a circuit which has been in use without giving notice to the superintendent or whoever is in charge of your intention to do so, and at the same time request that the same line be opened at the main station, and kept open until you have given notice that your work on that line is complete.

Fifth. In the dynamo room never go near the belts or dynamos, nor touch any apparatus unless you are fully informed and instructed how to do so.

Tools used by linemen should be provided with insulating handles of hard rubber or other equally good insulator. It is the duty of each lineman to look after his own tools and see that they are in good order, especially as to their insulation.

Sixth. Lamp trimmers and others engaged in the care of lamps must see that the switch putting the lamp in circuit is turned off before they handle the lamp in any way.

In construction work, a space of at least 20 inches must be left between the holes for pins on the cross arms, so that a lineman may get to the top of the pole and work without danger.

The same insurance association has collected the authentic records of a number of so-called "electric accidents" or accidents happening to the employés of electric companies. I have now before me the abstracts of 91 such cases.

The first thing that presents itself in looking over this set of abstracts is that very few of the accidents are in any way attributable to electricity directly, but would have occurred had the establishment in question been any kind of a factory where power was being used, or any place where heavy objects were being moved. A few examples will illustrate this, thus:

"No. 1. While steadying with a pike-pole a large electric light pole which was being placed in position, a passing 'low-gear' belonging to the Standard Oil Company ran over ankle."

"No. 2 While assisting in hoisting a stick of lumber from the street to the second floor of electric station, was injured in right foot by having the stick fall upon it."

"No. 9. Was going to dynamo, stepped on iron plate temporarily covering a belt hole in floor. The plate tipped and he fell partly through the opening, injuring him self internally."

"No. 17. Was oiling rocker shaft of engine near fly-wheel; leaned back too far and was struck on head by spider of fly-wheel."

The above are fair samples of the rest, and in fact out of the 91 cases but 15 (or about 16½ per cent.) have any direct relation to electricity.

As I have already mentioned, of the 15 cases in which the injury was in any way caused by electricity there are none in which the action would not have been avoided if the above quoted rules had been observed. Thus, beginning with first in order as arranged in the abstracts, all before it having no direct connection with electricity, we have:

"No. 11. While removing the wire from a Brush dial or regulator which had become short-circuited, was slightly burned on two fingers of right hand."

In this case the beneficial effect of rule No. 2 was manifestly expressed, and had the spirit of rule 7 been complied with, even the slight injury experienced would have been avoided.

The next in order is:

"No. 20. Was putting carbon in electric lamp which was out of order and failed to burn. Received charge of electricity, which caused him to fall down from step-ladder on to steam radiator. Two ribs broken."

This would clearly have been avoided by an observance of rule 7.

Time will not permit me to quote all the 15 cases, and I will, therefore, only repeat that they would, all of them, have been avoided by a strict observance in form and spirit of the above quoted seven rules or directions.

Of course I do not mean to imply by this that these rules are perfect or complete, but only that they seem to be in the right direction, and to furnish a starting point from which further developments may proceed.

No one having even an elementary knowledge of electricity as it existed 10 years ago, needed or needs to be convinced of its power to do harm where all safeguards are removed, and the occasional declarations of its harmless character which have been uttered can only be accounted for by reference to that combative disposition which impels some minds always to take a view in opposition to any which may be expressed, and gives birth now and then to a book or pamphlet disproving the law of gravitation or the solar origin of light and heat. To say this is, however, far from agreeing with the other extremists who would banish electricity from our daily walks and occupations, or place it under restrictions which *might* render it harmless, but which *certainly would* render it relatively useless for the countless purposes in which its efficiency demands its full development.

The true opinion is that which is supported by past experience, and which advocates the fullest developments of power to which this agency can attain, combined with the use of all the means of protection by which human intelligence can protect itself while using to the utmost this potent and, therefore, dangerous weapon in our victorious contest with the inimically destructive forces of nature.

The paper was read by Mr. Alexan-

(*Continued on page 6.*)

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This is the season of conventions and exhibitions. Here are some that are already settled upon: The St. Louis Electrical Exhibition, the Minneapolis Exhibition, the Sioux City Exhibition, the Telephone Convention, the Edison Convention, and American Street Railway Association Convention.

The usual squabble over the constitution furnished the regular semi-annual side-show for the silent members of the Electric Light Association. This constant revision is growing wearisome. The same time spent in the intelligent discussion of papers read before the Association would result more profitably.

We have just received reliable information from Yucatan indicating that yellow fever during the present season has caused much fatality among those engaged in the electric lighting business in the cities of Progresso and Merida. The former city is lighted by the Thomson-Houston system and the latter by the Brush. Within 10 days two of the four men engaged at the Progresso station died, and also two of the three employed at Merida. An American theatrical company exhibiting in Merida has lost its manager and leading man also from the dreaded fever, which seems to be unusually fatal this year. An American physician who has lived in Merida for 30 years has also died. Some of the men connected with the electric lighting companies originally came to engage as workmen upon the railway in which "Liverpool Jack" gained such notoriety. With such a death rate as this, it seems that Yucatan just at the present time is a good place to keep away from.

A COMPREHENSIVE REPORT.

The report of the Electric Light Convention in the ELECTRICAL REVIEW this week will be found to be complete and graphic. A comprehensive, succinct, interesting account appears; one that the active electrical man can read from beginning to end and understand at once, without having to wade through a mass of unnecessary discussion and comment. The points made by each speaker are clearly given, the papers published in full, the executive work clearly covered; and we think every one of the many thousand readers of the REVIEW will thank us for condensing and yet preserving these proceedings in this manner. We do not often refer to the individual members of our staff, but feel that on this occasion strong words of praise are due Mr. Stephen L. Coles, of the REVIEW staff, who had full charge of the report of the Convention proceedings.

THERMAL BATTERIES.

Several new forms of thermal batteries are described in this week's ELECTRICAL REVIEW. Progressive electrical inventors are concentrating a great deal of thought on the problem of direct conversion of heat into electricity. Whether or not a commercially efficient thermal generator will ever be produced is a question very hard to answer on *a priori* considerations; it involves a scientific conundrum, whether the highest possible return of electric current bears such a relation to the heat expended as to give thermal generators any show as competitors of the dynamo. A little more work of the kind done by Herz will give a sufficiently clear insight to the mathematical relation between heat and electricity to solve the problem. But it is quite possible that inventive genius will have pointed out the solution practically and commercially before the answer will be reached mathematically.

THE CAPE MAY CONVENTION.

The place and time of holding the Twelfth Convention of the National Electric Light Association were both propitious. The supply men and the central station men rubbed together as usual, with mutual benefit it is hoped. Several new things were exhibited, and the papers presented at the Convention opened the way for further improvements in details.

A good bit of work was done by the Convention in appointing a committee to report on "The Proper Classification of the Lighting Power of Incandescent Lamps."

Mr. Francisco's paper on "Municipal Lighting" was probably the most interesting on the list. His figures will be found difficult to disprove, we think.

An opportunity to do this has been given to Professor J. P. Barrett, the City Electrician of Chicago. That city runs its own electric lighting plant. Professor Barrett took broad exceptions to the figures quoted by Mr. Francisco for the operation of this plant, stating that "only two items were correct." The Association voted to publish Mr. Francisco's paper and distribute it broadcast. Professor Barrett asked that in respect of fair play this action be withheld for a month until he could prepare a reply to Mr. Francisco and submit it to the Association. This was tacitly agreed to.

Mr Lufkin's paper on "The Proper Basis for Determining Electric Motor Rates" is an able and interesting one, showing the need of a standard system of charges for current used for power purposes.

Our list of those present embraces the names of persons numbering in all 271, which is a good test of the popularity in which the Conventions of the National Electric Light Association are held, and may this continue and the association ever grow in strength and influence.

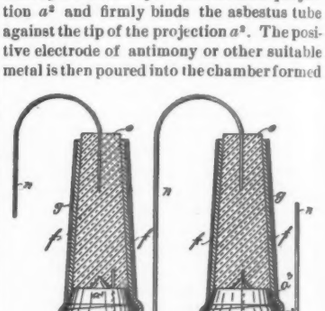
Next: The Telephone Convention at Detroit, September 9th.

SOME RECENT IMPORTANT PATENTS.

CHLORIDE OF SILVER BATTERY.

William M. Fink, of Elizabeth, N. J., has patented a chloride of silver depolarizing strip or electrode for open circuit batteries, in which the principal object is to reduce the high resistance of the chloride of silver. This is accomplished by attaching a sheet of silver foil to a silver wire, placing the two in a mold, the outer edges of the foil being bent so as to lie against the inner surface of the mold, and then pouring melted chloride of silver into the mold. When the electrode is completed the silver foil is distributed at various points on the external surface of the chloride of silver, and extends more or less throughout the mass of the same, converting the mass into a conductor of low resistance. The accompanying engraving illustrates the electrode in central vertical cross section.

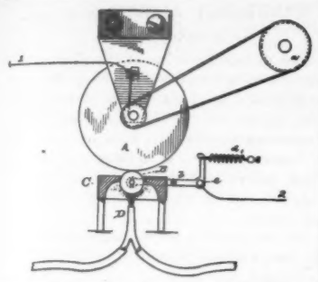
A NOVEL THERMAL COUPLE for a battery has recently been patented, the structure of which will be understood from the accompanying engraving. a^1 is the negative element of any suitable conducting metal, and is provided with a screw-threaded projection a^2 and tip a^3. Upon the latter rests the base of an asbestus tube *f*, and an exterior metallic sleeve *g* is secured upon the threaded projection a^2 and firmly binds the asbestus tube against the tip of the projection a^3. The positive electrode of antimony or other suitable metal is then poured into the chamber formed



by the top of the projection a^2 and the asbestus lining, and the element is complete. Conductors *n n* establishing electric connection between the successive pairs of elements are embedded in the positive and negative electrodes *o* and a^1 respectively. Elements constructed in this manner are alleged to be free from the difficulties usually present in thermo-electric couples due to the fusion of the antimony or antimony compound at the point where the heat is applied.

A NOVEL THERMAL BATTERY.

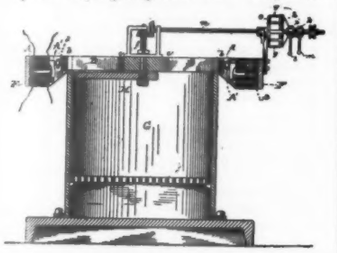
A thermo-electric couple has been patented by Thomas A. Edison, involving a novel mode of preserving a wide difference of potential between the two thermal elements. In the accompanying engraving which illustrates the device *A* represents a disk preserved in rotation by an electric motor *a*. *C* represents a fire-brick structure which is slotted at one point so as to permit the disk B forming the other element of the thermic couple to project through and bear upon the disk *A*, a spring *d* and elbow lever *b* serving to hold the disk *B* against the disk *A* with an elastic tension. A burner *D* is applied underneath the fire-brick hood or structure directly to the disk *B*, the fire-brick preventing the heat from reaching the disk *A*. Circuit connections 1 2 are led from the two disks. It is stated the disk *A* may be kept at a comparatively low temperature



with reference to the disk *B*, by reason of the fact that the hot disk is constantly changing its point of contact with the cooler one, offering the double advantage of yielding a high difference of temperature, and consequently high electro-motive-force, and yet removing the liability to fusion present in the metallic composition now used for thermal elements.

A NOVEL ELECTRIC GENERATOR.

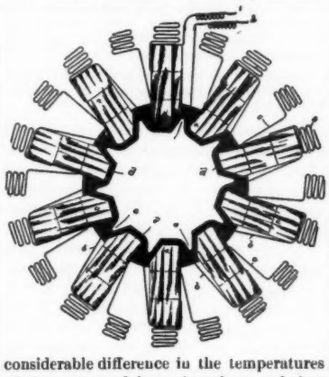
In the accompanying engraving we illustrate an interesting invention lately patented by Mr. Edison, in which the force of expansion and contraction of metal is utilized to produce motion between the two parts of a magnetic circuit, and generate current by the induction on a surrounding coil exerted by the varying magnetic field. *G* represents



a furnace provided with a suitable grate, across the upper portion of which is radially arranged a series of nickel bars *D*, having their inner ends fixed to a hub, and their outer ends connected by means of an adjusting screw *d*, with the pivoted limb *A* of a magnetic circuit. Two coils surround the two sides of the magnetic circuit as shown. There is a circular series of these magnetic systems corresponding to the number of radial nickel bars *D*. The pivoted limb A^1 of each magnetic circuit has its inner portion in very close juxtaposition to the fixed portion of the core which enters the upper coil. A semi circular sheath *H* is fixed to a central post and kept in continuous slow rotation. This sheath covers one-half of the radial series of nickel bars at a time, and, as it revolves, it covers and uncovers the bars, admitting and cutting off the heat from the furnace to them in regular order. When the heat has access to the bars they expand and when cut off from them they contract. The enormous mechanical force exerted by this movement opens and closes the magnetic circuit formed by the cores *A A*. The nut *d* is so adjusted that when the bars *d* are expanded the two limbs of the magnet core are in contact. When the bar cools this contact is broken and a wide variation of magnetic resistance is created which acts upon the upper coil inductively and develops a current. A source of continuous current, as a battery or any other suitable generator, is used to magnetize the cores through the influence of the lower series of coils, or a shunt from the circuit supplied by the upper coils may be carried through the lower coils, in which case an auxiliary current will have to be used only in starting the apparatus into action. The direction of the current in the upper induced coils varies accordingly as the bars *d* contract or expand, and the reversals may be straightened by means of a commutator, shown at the right of the illustration, so as to develop in the external circuit a current of continuous direction. A slow movement is imparted to the semi-circular disk *H*, and a current will be thrown into external circuit as long as heat is supplied by the furnace *G*.

ANOTHER IMPROVED THERMAL BATTERY.

Harry B. Cox, of Hartford, Conn., has taken out several patents relating to improvements in thermal batteries. The accompanying engraving illustrates several of these improvements. A series of radially arranged thermal couples, connected together in series and secured at their inner ends in a mass of vitrified fire-proof cement, are superposed upon each other, a layer of asbestus or other material being interposed between the successive layers, and the cylindrical chamber thus formed in the center of the pile of elements is connected with a source of heat so that the inner junctions of all the radially arranged elements are heated. A series of deflecting plates, not shown in the engraving, is supported within the central chamber or flue, and these gradually increase in diameter toward the upper end of the pile, causing more and more heat to be deflected against the elements as the hot air rises toward the top of the pile, thus compensating for the decrease in temperature of the hot air as it rises. Between the outer and inner junctions of each couple is a series of radiators, *c c*, molded or otherwise firmly secured to the body of the element, and extending outwardly and offering considerable radiating surface to the air. It is stated that these radiators preserve a



considerable difference in the temperatures of the outer and inner junctions, and thus increase the electro-motive force and constancy of the battery.

Underground Wires.

The Committee on Underground Wires made the following report at the Electric Light Convention, Cape May, August 21st:

At the Kansas City Convention, held last February, the following members were appointed a Committee on Underground Conduits and Conductors, viz.:

J. E. Lockwood, of Detroit, Mich.
C. H. Wilmerding, of Chicago, Ill.
S. S. Wheeler, of New York.
T. C. Smith, of Philadelphia, Pa.
D. E. Evans, of Baltimore, Md.

Your committee now desire to report that they have perfected a plan of work, but before carrying out same desire the opinion of the Association, and any suggestion that members especially interested may desire to make.

The plan of work adopted is first to secure from each electric light or power company operating any high tension underground conductors a full description of the conduit and conductors in use, the character of the current used, and how long same has been in use, which information, when classified and tabulated, will indicate plainly the condition of the subject at the present date, and will give us a starting point to work from. We then intend to secure the co-operation of these companies in our next step, which will be to have each company keep account of the cost of maintenance and repairs to the conduits and conductors, and of all changes or additions thereto, also of the average hours per day the system is operated. This information, when classified and tabulated, will show the cost of operating underground conductors, and if regularly reported to the committee, will show whether or not progress is being made in this direction, and whether the systems in use are likely to prove permanently successful, or to finally fail.

It is also designed to include in these reports a list of all grounds, burn outs, etc., and their causes, with suggestions looking to the removing of said causes.

The committee would of course keep private the names of all companies furnishing such information, simply reporting same in tabulated form. These reports would be invaluable to companies operating such conductors, as they would have not only their own experience to improve upon but also that of all other companies operating underground conductors.

In regard to the details of the plan of work proposed, we have decided on first obtaining the following information, viz:

CONDUITS.

1st. A full description of the conduit used, kind of man or handholes, provision for taking off service, etc.
2d. Mileage of conduits laid and in use.
3d. Mileage of duct laid and in use.
4th. Number of manholes.
5th. Number of handholes.
6th. Length of time in use.

CONDUCTORS.

1st. Description of the conductor in use, stating size of conductor, kind and thickness of insulation, and if insulation is covered, in what manner.
2d. How long same has been laid and in use.
3d. Mileage of conductors laid and in use.
4th. Average hours per diem same is operated.
5th. Electro motive force and character of current used.

The above information would give us a good basis to work on; we would then endeavor to have each company operating high tension underground conductors keep the following records, and report same regularly to the committee just before each Convention, so that same could be properly classified, tabulated and reported.

RECORDS.—CONDUITS.

Mileage of conduit laid and in use.
Mileage of duct laid and in use.
Number of manholes.
Number of handholes.
Number of services taken direct from conduit.
Cost of maintenance per month.
Cost of repairs per month.
Description of any new work done since last report.
Troubles with conduit, man or handholes, and suggestions as to how same can be remedied.

CONDUCTORS.

Mileage of conductors laid and in use, number of circuits, and mileage of each.
Cost of maintenance per month.
Cost of repairs per month.
Number of burn outs and causes.
Troubles of other kinds and causes.
Suggestions as to how troubles can be remedied.
Average hours per diem circuits are operated.
Voltage and character of current used.

CHANGES OR NEW WORK.

Mileage of conduit or conductors abandoned.
Mileage of conduit or conductors added since last report.

The above reports would, of course, be separately classified for different kinds of conduits, conductors and currents.

Your committee think that these records should be kept continuously and reported regularly, until the question of operating high tension underground conductors is solved or effectually disposed of, and to do this we recommend that the committee be made permanent, and that members be elected annually at the February Conventions.

The committee should report at each convention—

The number of companies operating high tension underground conductors.
The mileage of conduits, ducts and conductors in use.
The cost per mile per month of conduits maintenance and repairs.
The cost per mile per month of conductor maintenance and repairs.
The average number of burn outs and grounds per mile of conductors used, and the causes.
Also report all conduits, conductors, etc., that had proved failures and were abandoned.

In this manner the association would keep thoroughly posted regarding the progress of the subject and would be supplied with the actual records made by the different systems; the members of the association could then judge for themselves of the success of the different systems, and thus be able to act intelligently in case they desired to do any work in this line.

As this plan is intended to extend beyond the time for which this committee was selected, we have recommended that same be adopted by the association, and that provision be made for the annual appointing of members to the committee.

If this meets the approval of the Convention, we would appreciate any suggestion from members who are especially interested in this subject, looking to the perfecting of the plan of work.

The Gilbert Car Manufacturing Company, of Troy, N. Y., is building a very handsome private car for the use of the Short Electric Railway Company upon the electric lines in Cleveland, O.

A FEW SCATTERING CONVENTION NOTES.

George Porter said this was his eleventh.

Secretary Foote regularly took his daily dip in the surf.

Mr. George A. McKinlock ably represented that progressive electrical house, the Central Electric Company, of Chicago.

Gen. O. E. Madden insisted on calling the Stockton "Hughes Hotel." The head waiter's name was Hughes, and he was a good one.

A neat circular letter was distributed to all the attendants at the Convention by J. J. Ryan, the brass founder and finisher of 74 West Monroe street, Chicago.

R. T. White, of Boston, exhibited his "Daisy" chair for use in electric railway work, and had the satisfaction of receiving some very large orders from the representatives of electric companies present.

The Electrical Supply Company, of Chicago, and Ansonia, Conn., had a great deal of very handsomely printed and illustrated matter at the Convention, which was given out from a table in the central corridor.

Providence, R. I., is the next place of meeting. Every one seems to regard it as a good place, too. This is where President Perry, Eugene Phillips, who will be chairman of the Entertainment Committee, electrician Sawyer and those other fellows indulge in smiles of welcome.

Cape May was a good Convention ground—good enough for landlord Walton at all events. The morning dip in the surf was largely looked forward to, and every one vied with every one else in the matter of sunburn. The depth of color ranged from a brilliant lobster red to a dark mahogany.

One of the most active electrical men of New England is A. M. Young, of Waterbury, Conn., who was present with his wife. Besides being largely interested in the installation of electric light plants on the most improved plan, Mr. Young is rapidly becoming quite an extensive manufacturer of various electrical supplies.

FINANCIAL.

Closing quotations of electric stocks, from F. Z. Maguire, Electrical Securities, 18 Wall street, N. Y., Saturday, August 23. New York, Boston and Washington Stock Exchanges.

NEW YORK.	
Western Union Telegraph Co	83¼.
Edison General Electric Co	102.
" " Preferred	90.
Consolidated Electric Light	60.
Edison Electric Illuminating Co.	
United States Electric Light	35.
BOSTON.	
Thomson-Houston Electric Co	50¼.
" " " Preferred	93¼.
" " " Series C	
" " " Series D	8¼.
" " International	
" " Welding Co.	
" " European Welding Co.	87.
Westinghouse Electric Co	38.
Ft. Wayne Electric Co	12.
TELEPHONE:	
American Bell	223.
Erie	50¼.
New England	50.
Mexican	85.
Tropical American	
MISCELLANEOUS:	
Edison Phonograph Doll	3¼.
WASHINGTON.	
Pennsylvania Telephone	25.
Chesapeake and Potomac	*75.
American Graphophone	14.
United States Electric Light (Washington)	140.
Eckington and Soldiers' Home Railway	68.

*Ex. Dividend.

The earnings of the West End Street Railway Company, of Boston, are running between $22,000 and $25,000 per day. For the first 14 days in August gross earnings were about $70,000 larger than for corresponding period last year. This road it will be remembered is equipped with the overhead electric system.

Cars and trucks for the Cincinnati and South Covington Street Railway Company, of Covington, Ky., having been received, motors are being placed upon the trucks and generators in the station, and the line will be put into operation within a few days. This entire road is equipped with line appliances and motors manufactured by the Short Electric Railway Company.

THE CAPE MAY CONVENTION.

(*Continued from page 3.*)

der, of New York, and the discussion was opened by Mr. W. R. Freathy, of Boston. Mr. Freathy spoke from the insurance company's standpoint of the great trouble from the interference of the daily press and the prejudice of the public regarding the danger from electric currents. After the insurance company which he represented had secured copies of all the rules obtainable for the instruction of linemen and other employés in handling currents, they were submitted to Professor Morton as an electrical expert, and he was asked to formulate the set of rules which formed a part of the paper just read. Mr. Freathy desired to get the concentrated essence of opinion of the National Electric Light Association in this matter, and asked the members to assist him to that end.

The subject was then opened by the Chairman for general discussion.

Mr. M. J. Francisco, of Rutland, Vt., wanted to know why the companies charged such high rates for insurance, to which question Mr. Freathy made a brief reply.

Mr. Alexander offered a resolution that it be the sense of the Convention to have a copy of Professor Morton's rules posted in every electric light station. Seconded and passed.

Judge Armstrong thought the central station companies ought to furnish complete and specific information regarding every accident which occurred. This, in his opinion, would lead to a lower rate of insurance. He would be glad to see the matter put in the hands of a special committee.

President Perry thought that the Committee on Data ought to be the proper committee to refer the matter to, whereupon Judge Armstrong moved that the committee be so instructed and ordered to present a report at the next Convention. Seconded and carried.

Mr. John A. Seely, of New York, moved, seconded by Mr. H. L. Storke, that a vote of thanks be extended by the Association to Professor Morton for his valuable and interesting paper. Carried.

Mr. Geo. Cutter, of Chicago, chairman of the Committee on National Insurance Rules, read the committee's report.

REPORT OF THE COMMITTEE ON NATIONAL INSURANCE RULES.

Mr. President, Gentlemen—

Your committee have at this session simply to report progress, as the object for which it considers itself appointed has not been completed, viz., the codification of a set of rules regarding electric light and power installations which shall become national in character, and be used instead of the many sets of rules put forth by the different insurance associations throughout the country.

We have written the following letter to many insurance associations throughout the United States.

CHICAGO, ILL, April 8th, 1890.

Dear Sir:—At the last meeting of the National Electric Light Association in Kansas City, a committee was appointed to select delegates or representatives from the different insurance associations in the country, and also from the electric light companies, to a National Electric Insurance Committee. This committee will probably consist of 11 or 13 members, the majority to be insurance men. They are to devise a set of insurance rules concerning electric light installations which shall be enforced all over the country. It is found at present that different rules are enforced now in different parts of the country, and in many places two sets of rules, more or less conflicting, cover the same territory. We hope to remedy the evils of this by devising one set, and have this set supported by insurance men throughout the United States.

In order to have these rules the best for the purpose, they should represent the average opinion of the various men who have had experience in this particular line, and also who represent the different interests involved. It is our aim to get a committee thoroughly well balanced as to the conflicting interests, so that the resultant opinion of them all will be so strong an expression of the best methods for electric work as to meet the support of all the insurance people and the electric light people also.

We wish you would name your choice as a representative upon this committee. We are already accumulating a great deal of information on insurance rules all over the world, so that when this committee hold their meeting they will have the work so far advanced that a good set of rules can be arranged without very much delay.

As there are many electric light inspectors who have had valuable experience and understand the subject pretty well whom we expect to have upon this committee, we feel that such committee will be a great benefit both to insurance and electric light interests. It is our ambition to have this committee so carefully selected that it will become a body of referees to settle all important questions arising in relation to proper electric work. We trust you will realize the importance of this and give it prompt and careful attention, and be prepared to support the decision of such a committee.

Hoping to hear from you soon, and to have your support in this valuable work, we remain,

Very respectfully yours, GEO. CUTTER.

Chairman Insurance Committee, National Electric Light Association.

The answers to these letters were almost universally favorable, and contained many expressions of appreciation on the part of the insurance people of the efforts made by this Association to work in harmony with them in devising these rules, and in advancing information leading towards good and safe construction.

You can, of course, readily understand that it has occupied much time and correspondence to determine just what associations to approach, and how to approach them, and get them to fully understand our object in order that they should send a representative to act upon this committee. As a result of this work, we have the pleasure of informing you that the following gentlemen have come to Cape May as representatives of the various associations and companies named.

These gentlemen have been in session most of the time for several days discussing the different rules and laboring to outline a frame-work, so to speak, of what they term generic rules. It was the general feeling that these rules should be made concise and as few as possible, and still cover the basic principles of good work.

Your committee have the pleasure of stating to you that the insurance representatives present were quite generally agreed with a feeling of good will towards electric light and power installations, and they do not feel afraid of them.

The deliberations upon this set of rules have been referred to a sub-committee for further study, both to eliminate any mistaken positions, and also to frame them in proper wording.

They have also taken the necessary steps to communicate with one another for the purpose of arranging these rules so they can meet the approval of the different representatives, and be adopted in place of the rules now in force. It is the opinion of these gentlemen that this work will be accomplished, and that they will enable your committee to report to the next meeting of this Association the uniform set of rules that you have wished for, and also that they will be supported by the various insurance associations.

It was voted at the last meeting that we should express to you their appreciation of your efforts to work in harmony with them in this direction, and assure you of their good will and reciprocity of feeling in the same line.

Your committee have also corresponded with various European authorities to learn their methods of inspection, and also to secure copies of the rules they have in force, and we have in our possession various sets of rules from England, France, Germany and Italy, and these sets of rules, with their accompanying information, will probably influence to a considerable extent the rules which we will adopt. The force of this can be especially appreciated by quoting part of the report of the Committee on Lighting, Heating and Patents, appointed by the National Board of Fire Underwriters, which report was presented to the National Board last Winter:

"The great problem before us to-day, however, is the management of the various systems of electric lighting so as to insure safety from fire. When such lights were first introduced, underwriters congratulated themselves that at last the long sought means of illumination without danger had been found. No matches, no kerosene explosions, no swinging gas brackets would hereafter vex them, but a steady, safe and brilliant light which could do no possible harm had come among us, and all were happy.

"It did not take many months, however, to discover that the electric light was not the harmless thing we had imagined, but that it was a prolific source of danger, and its introduction has cost the insurance companies more than any method of lighting heretofore in use. It has come to stay, and some time it will probably be as safe as any light in use, but our knowledge of its properties and of its management must be vastly increased before that time appears. We see the danger, but as yet are too ignorant to point out the remedy. What yesterday seemed a safe method of installation, to-day proves dangerous, and what we regard as safe to-day is likely to develop danger to-morrow. We can only wait and study.

"For a number of years the National Board has followed the action of the New York Board in the matter of rules regulating electric light equipments. Those rules were revised and re-issued by that board January 15, 1890, and it is recommended that they be adopted by this body as thus revised, and promulgated to members."

In this connection it is proper to say that the National Electric Light Association, in a letter appended to this report, asks the National Board to nominate a representative upon a committee to be drawn from bodies of underwriters and electrical experts in different parts of the country, to devise and recommend rules for electric light installations, which shall be uniform throughout the land, and tend to throw safeguards about the use of such lights. Your committee recommends that the invitation be accepted, and a representative be appointed. Certainly, nothing but good can come out of the deliberations of such a committee, and it is necessary that we should in every way increase our knowledge of what has become so important a factor in our business, and if possible, remove some of the dangers now attending it.

Precisely what is expected of this committee in regard to the third topic named in this report, viz., "Patents," they are unable to say, but nothing in this department has been brought before them which seems to require any report.

And then to show the opposite opinion held by insurance companies in Europe as well as many in this country. The Phœnix Fire Office Rules of London were first issued in 1862, and their edition of 1889 contains the following statements, viz.: "Notwithstanding the number of years that these rules have been in force, not a single fire has yet occurred from any electrical installation that has been placed up in compliance with them. The electric light is the safest of all illuminants, and is preferable to any other when the installation has been thoroughly well put up."

The electric light and power interests are of great importance in Italy, and the only rules in force in that country are those established by the government to protect its telegraph and telephone circuits. There are no insurance rules in Italy, and no insurance inspection of electrical installations, and places lighted by electric lights have the benefit of a diminished rate.

In conclusion, gentlemen, your committee respectfully ask for more time to complete their work.

This committee is made up as follows: Geo. Cutter, chairman; C. M. Goddard, clerk; N. J. Jenks, representing the Edison Company; J. R. Lovejoy, Thomson-Houston Company; P. H Alexander, Westinghouse Company; T. Carpenter Smith, engineering firm; George Cutter, electrical supplies; Wm. H. McDevitt, Philadelphia Board of Fire Underwriters; Wm. DeL. Boughton, New York Board of Fire Underwriters; H. O. Kline, Underwriters' Association of the Middle Department; Wm. A. Anderson, National Board of Fire Underwriters; Capt. Brophy, Associated Factory Mutual Ins. Co., Boston; F. C. Cabot, Boston Board of Fire Underwriters; C. E. Bliven, Western Union Fire Underwriters' Association; John P. Barrett, Cleveland and Chicago Boards; Robert McMath, St. Louis Board; S. E. Barton, Central Station Insurance; C. M. Goddard, New England Insurance Exchange; J. S. Alfred, South Eastern Tariff Association; J. J. Babcock, Underwriters' Association of New York State.

Mr. Cutter stated in his report that the work of the committee was not completed, and he could only give a summary of progress thus far, though it was hoped by the next Convention to be able to present a code of rules for the endorsement of the National Electric Light Association. In response to the invitation of the committee a number of insurance men had come to Cape May from all over the country. They had been in session most of the time since their arrival formulating a set of auxiliary rules.

Mr. J. J. Burleigh, of Camden, seconded by Mr. Seely, moved that the report be accepted and the committee continued.

A long discussion followed the reading of the report, and the subject was finally disposed of by Dr. Mason's motion to table the whole matter.

As announced at the morning session, the discussion of the "Proper Classification of the Lighting Power of Incandescent Lamps," was opened by Dr. Bell. Mr. A. V. Garratt and Mr. P. H. Alexander gave their views on the subject, and President Perry also made some remarks. Mr. Garratt moved to appoint a committee of three to report on the subject at the next Convention. Seconded and carried.

Secretary Foote, on behalf of the Entertainment Committee, announced a programme, consisting of dancing, music and recitations for each evening during the Convention.

A meeting of the Executive Committee was announced for 8 P. M.

Mr. Storke then moved to adjourn the Convention till 10 A. M. Wednesday. Seconded and carried.

WEDNESDAY, AUGUST 20TH, 1890.

FORENOON SESSION.

The morning session of the Convention was called to order by President Perry at 10.35 with a good attendance of members. The report of the Committee on Patent Legislation was the first item in the order of business. Mr. C. H. Wilmerding, of Chicago, moved that the committee be discharged, and the report accepted. Seconded and carried.

Mr. Wilmerding as chairman, then read the report of the Committee on Legislation, as follows:

REPORT OF THE NATIONAL COMMITTEE ON LEGISLATION.

Members of the Committee—C. H. Wilmerding, chairman:

Alabama—
Arkansas—
California—George H. Roe.
Colorado—C. H. Smith.
Connecticut—John C. English.
Delaware—
District of Columbia—Geo. C. Maynard.
Florida—
Georgia—H. E. W. Palmer.
Illinois—C. H. Wilmerding.
Indiana—John Caven.
Iowa—
Kansas—L. A Beebe.
Kentucky—A. H. Barrett.
Louisiana—
Maine—William R. Wood.
Maryland—J. F. Morrison.
Massachusetts—F. A. Gilbert.
Michigan—J. E. Lockwood.
Minnesota—
Mississippi—
Missouri—Joseph A. Corby.
Montana—
Nebraska—
Nevada—
New Hampshire—Alonzo Elliott.
New Jersey—Henry W. Pope.
New York—E. A. Maher.
North Carolina—D. A. Tompkins.
North Dakota—Vincent S. Stone.
Ohio—Charles R. Faben, Jr.
Oregon—P. F. Morey.
Pennsylvania—A. J. DeCamp.
Rhode Island—Marsden J. Perry.
South Carolina—George B. Edwards.
South Dakota—
Tennessee—
Texas—
Vermont—M. J. Francisco.
Virginia—
West Virginia—John B. Garden.
Wisconsin—S. S. Badger.
Washington—

1. At the Eleventh Convention this committee was instructed to "report for the action of the next Convention such changes in the constitution as will in its opinion best provide for the membership and representation of State Associations in the National Association." (Volume VIII, page 249.)

After this action had been taken, the Convention raised a special committee charged with the duty of making a general revision of the constitution of this Association. In view of this, this committee has considered itself discharged from further consideration of the subject.

2. By action of the Eleventh Convention, this committee was instructed "to co-operate with the New York State Association in securing such an amendment" to the execution law of that State as to require a special apparatus to be devised for the purpose, that shall generate a current of not less than 10,000 volts." (Volume VIII, page 248.)

No request has been received from the New York State Association for such co-operation, and so far as this committee is informed, no effort was made during the last session of the legislature of that State to so amend the law. In the light of the reports made regarding the experimental execution that has since taken place in that State, it is now probably as clear to the public as it has been to this committee, that if executions are to be made by the use of electric currents the amendment to the execution law recommended by this Association at its Eleventh Convention is demanded by every humane and equitable consideration.

3. During the legislative season of 1889-1890, comparatively few State legislatures were in session. During the coming legislative season of 1890-1891, a large number of State legislatures will be in session.

If legislation touching electrical interests proves as attractive to the coming legislatures as it was to those that have recently been in session, there will exist an exciting cause sufficiently urgent to fuse all central station companies in every State into a compact organization for the protection of their mutual interests.

That ill-advised legislation will be met with in every State admits of no doubt. So long as would-be law-creators think it a factor of popularity to show in their legislative records that they introduced bills or advo-

cated measures that are intended to be, or are in fact, antagonistic to the practical development of the electrical industries, such things will be done; or, so long as persons interested in patented apparatus and systems think they can gain a commercial advantage for such interests through legislative enactments, they will seek to secure such enactments regardless of their effect on electrical interests in general.

4. That those interested in the electrical industries in each State will be thoroughly organized and equipped to meet the emergencies that will be thrust upon them is very much in doubt. There is no sense of security equal to ignorance of danger. For those who are ignorant of a danger it has no existence. This we fear is the condition of most central station companies in this country regarding impending dangers from legislation. In view of this, the greatest service that may now be performed is to so state the threatening dangers that they can no longer remain in ignorance of them. To do this there is no need to speak of unreal things that are but creations of imagination. Sufficient material for the purpose is found in the record of things that are.

5. To show the tendency and animus of thought of those intrusted with the responsibility of legislating for the good of the people, a critical analysis is asked for the following brief reports on the work done by the legislatures of a number of States during the last season.

6—CONNECTICUT.

(Senate Bill No. 4.) Chapter IX.

"An act relating to attachments and judgment liens."

7—MASSACHUSETTS.

No better presentation can be made of the subject for the State of Massachusetts than to present in full the report herewith of the counsel of Massachusetts Electric Light Association, made at its first annual meeting, under date of July 8, 1890.

8—NEW JERSEY.

February 12, 1890, a substitute for "Assembly 113" was introduced "by Committee on Municipal Corporations;" an act relating to electric, telephone and telegraph wires, creating Boards of Electrical Control in cities of the first and second class."

February 14, 1890, Assembly No. 6, introduced by Mr. Smith and referred to Committee on Corporations.

"An act in relation to telegraph, telephone and electric companies in cities of this State."

9.—NEW YORK.

January 21, 1890, in Assembly, No. 160. Introduced by Mr. Whipple, read once and referred to the Committee on Ways and Means.

"An act to create a Board of Electrical Commissioners and to define and regulate its powers and duties."

February 20, 1890, in Assembly, No. 598. Introduced by Mr. J. H. Stevens (by request), read once and referred to the Committee on Electricity, Gas and Water Supply.

"An act authorizing water companies to manufacture and use electricity for the lighting of streets, public places and private buildings in cities, villages and towns within this State."

February 21, 1890, in Assembly, No. 629. Introduced by Mr. Whipple, read once and referred to Committee on Electricity, Gas and Water Supply.

"An act to protect life and prevent accidents in the use of high tension electric currents."

April 4, 1890, in Assembly, No. 1387. Introduced by Mr. Nolan, read once and referred to the Committee on Electricity, Gas and Water Supply.

"An act to create a State Board of Commissioners of Electrical Control and to define and regulate its power and duties."

April 18, 1890, in Senate, No. 618. Introduced by Mr. Erwin, read twice and by unanimous consent ordered printed and when printed committed to the Committee on General Laws.

"An act to create a Board of Electrical Commissioners and to define and regulate its powers and duties."

April 18, 1890, in Senate, No. 634. Introduced by Mr. Erwin, read twice and by unanimous consent ordered printed and when printed to be committed to the Committee on General Laws; report favorably from said Committee, with amendments, and committed to the Committee of the Whole:

"An act to create a State Board of Electrical Control, and to define and regulate its powers and duties."

In transmitting copies of these bills to the chairman of this committee, J. W. Eaton, Jr., Attorney, of Albany, N. Y., writes as follows:—

"None of these bills have become laws. I am of the opinion that an attempt will be made next year to rush through the Legislature a bill combining most of the principal features of those sent you, unless some determined opposition developes in the meantime. I believe there is also a movement in favor of adding an electrical expert to the present railroad commission and putting the matter under their charge. There was no law of general interest affecting electrical lighting passed this session."

10—OHIO.

The legislature of this State was urged to action by the following highly electrified paragraph in the inaugural address of Governor Campbell (see reports in daily press, January 13, 1890):

"The application of electricity is rapidly opening up new fields of legislation. Unless something be done to prevent the sacrifice of life daily resulting from the effect of electrical wires, the companies which put up and control them will have grown so rich and powerful that the passage and enforcement of proper laws will be difficult. Municipalities have attempted to enforce regulations for protection from such dangers, but without satisfactory results. The duty of investigating the generation and distribution of electrical currents is one which presses upon you. The investigation should be prompt and thorough, the result thereof made public, and such action taken as may, in your judgement, throttle this evil in its infancy."

Two bills were introduced into the Ohio legislature. One for the placing of all electric wires underground, the other to limit the voltage of electric currents; neither of which became laws.

11.—VIRGINIA.

(Senate Bill No. 238). A bill for the prevention of danger from electric currents. Patron—Mr. Lovenstein. Referred to the Committee on General Laws.

12. While this report does not completely cover the ground, owing to difficulty experienced by this committee in obtaining copies of bills and definite information regarding action taken on them, the showing is sufficient to demand attention from every one interested in the electrical industries, and will enable them to form some idea of the legislative work that is near at hand during the season of 1890-1891, when the legislatures of some 37 States will be in session.

13. This committee desires to call attention to the fact that all legislation is directed to the regulation of the use of electrical apparatus, not to its manufacture and sale. This use includes all forms of apparatus, the telegraph and telephone, as well as the generation and transmission of electric currents for light and power. Such legislation affects, primarily, the interests of those who have their capital invested in plants for furnishing such service, and thus establishes a community of interest between them. The interests of manufacturing companies and supply houses in such legislation is secondary, as they are only affected through the effect on operating companies. For these reasons, and in view of the fact that legislation is confined to State legislatures, there is a real necessity for the operating companies in every State to form themselves into associations for the development and protection of their mutual interests

14. In analyzing the subjects of legislation, this committee would be untrue to the interests it represents, should it fail to bring to notice the fact that most of the so-called antagonistic legislation is not the result of a popular demand, but issues from those interests that seek a commercial advantage by legislation that, either directly or by implication, would create conditions favorable to their particular apparatus or systems. A diminution of efforts of this kind may be reasonably expected, as the art of generating, distributing and using electric currents becomes more and more a matter of common information, and electrical systems approach more nearly to the zenith of their development.

(*a*). To give practical effect to the "Memorial and Statement" presented to Congress in the name of this Association by its president, which was presented in the United States Senate by Senator Hale on August 5th, and was referred to the Committee on the Census and ordered printed, a member of this committee has prepared a bill which was introduced in the Senate of the United States August 15th by Senator Hale. It was read twice and referred to the Committee on the Census.

This bill is as follows:

IN THE SENATE OF THE UNITED STATES.
AUGUST 15, 1890.

Mr. Hale (by request) introduced the following bill, which was read twice and referred to the Committee on the Census.

"A bill to amend an act entitled "An act to provide for taking the eleventh and subsequent censuses," approved March 1st, 1889.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that, for the purpose of rendering the investigation of the electrical industries by the eleventh census thorough and complete in every detail, the Superintendent of Census, under the direction of the Secretary of the Interior, is hereby authorized and directed to make such subdivisions of the subject as may seem to him advisable, and to associate with the special agent now commissioned to investigate the manufacture of electrical apparatus and supplies and their uses, as special expert, the ablest person whose services can be secured, to write the statement for each subdivision so made, subject to the supervision of said special agent, and the sum of $50,000, or so much thereof as may be necessary, is hereby appropriated out of any money in the Treasury not otherwise appropriated."

Your committee recommend that the Association endorse this bill and urge its enactment, and that a resolution of thanks be tendered Senator Hale for his courteous and prompt action regarding this subject.

President Perry remarked at the conclusion of the reading that the committee had in their possession copies of the bills mentioned in the report. These would be incorporated in the report, and when published in the proceedings of the Association would be of great service to central station men.

The Chairman then said that he had learned with pleasure of the presence of Mr. Geo. S. Bowen, of Chicago, the first presiding officer of the National Electric Light Association, and would appoint Mr. Edgar and Mr. DeCamp a committee of two to escort Mr. Bowen to the platform.

Mr. Bowen thanked the committee for the delicate compliment, and proceeded to give a very interesting talk regarding the formation of the Association.

Mr. E. R. Weeks, of Kansas City, on behalf of the Executive Committee, then moved to elect Mr. Bowen an honorary member of the National Electric Light Association. Seconded and carried.

The regular order of business was resumed, and the discussion on the report of the Committee on Legislation was opened. Dr. A. F. Mason, of Boston, then offered the following resolution, seconded by Mr. DeCamp, and carried:

Whereas, On the 15th day of August, 1890, the Honorable Senator Eugene Hale introduced in the Senate of the United States a bill to amend an act entitled "An act to provide for taking the eleventh and subsequent census," approved March 1, 1889, and,

Whereas, The said bill was read twice and referred to the Committee on the Census; and,

Whereas, In the opinion of the National Electric Light Association, the passage of this bill is essential to the rendering the investigation of the electrical industries by the eleventh census thorough and complete; therefore, be it

Resolved, That the President of this Association be requested to express this our opinion to the committee on the census, and urge the committee to favorably report to the Senate the bill referred to.

Resolved, That the thanks of this Association be rendered to Senator Hale for his services in the bill above referred to.

The following paper on "Municipal Lighting" was read by Mr. M. J. Francisco, of Rutland, Vt.

"MUNICIPAL LIGHTING."

Mr. President and Gentlemen of The National Electric Light Association:

The electric spark that Franklin gathered upon his key lay dormant for years, until from the fires of genius, guided by the finger of science, there flashed forth the electric light. This has been increased and magnified, until to-day America stands as the exponent of this science, with 300,000 arc and 4,000,000 incandescent lamps flashing like meteors across the continent. Thus has science aided nature in lighting up the streets and highways of our native land, from the shores of the Atlantic, across the snowy peaks of the Rocky Mountains, to the golden shores of the Pacific.

This vast industry, requiring an army of over 300,000 men and an investment of $500,000,000, is the result of American genius and enterprise. Truly we may well congratulate ourselves that we are here to-day as the representatives of this science and industry which is revolutionizing the world. Not only has the globe been encircled with telegraph symbols and the human voice sent flying across space for thousands of miles, but the ocean itself has been studded with electric lights, guiding the mariner across its waste of waters and flashing its brilliant hues as a welcome beacon upon the weary eyes of many a watching crew, whose vessel was sinking in mid-ocean.

This science, fraught with so much good for mankind, which has put millions of money into circulation, and furnished employment to thousands of laboring men and others, is now menaced by men who, posing as economists, desire to use this power for political and other purposes, as well as for their own aggrandisement, regardless of the interest of the masses or the public welfare. The plain English of this movement is municipal control of electric lighting plants.

Who are the great apostles of municipal ownership of electric lighting plants, claiming that municipalities can furnish lights cheaper than private corporations? Mostly visionary, theoretical dreamers. Not one has had a single day's practical experience in the electric lighting business. For example, we were treated to a specious article in the New York *Independent*, purporting to come from a professor of Johns Hopkins University. An examination of the article shows at once that the author has no experience or practical knowledge of the business, and proves to be simply a youth from Omaha, Neb., who has been studying there for a couple of years. He is now told to cry monopoly, and this article is the result. These are the persons who are being used by professed economists, wire-pullers and others as figure-heads; who make statements based upon a state of things that do not exist, and use such statements in contradiction of the actual experience of practical men and the best scientists of this generation, who have not only made the subject a study, but demonstrated the same by testing it every night for years.

If a municipality can sell electricity cheaper than private corporations, why should they not manage all other industries and trades of the country? All cities have large amounts of printing done; why not have the city own and run paper mills and printing offices? also, street cars, and own mines and sell coal? They also use immense quantities of stone, building material, etc. Then have them run a marble quarry. The taxpayers use carriages; let the city build these also. And so on, with every industry requiring the investment of private capital. If municipalities can save the taxpayer money in controlling and manipulating one industry, why not all? If they can do it cheaper, then every taxpayer would receive the same proportional benefit as is claimed for electric lights.

The great argument used in support of municipal control of lighting plants is a list of cities, with what purports to be accounts of the cost of their electric lights, where over half of the expense of the lights has been charged to other departments. Among these are Bay City, Bangor, Dunkirk, Chicago, Ypsilanti, Topeka and Lewiston.

We will examine a few of the claims made as to the cost of lights in these cities.

The City Superintendent of Bay City, Mich., reported that the cost of the electric lights was only $40 per year. The Council of Bay City appointed a special committee to investigate the expense of city lights, and they submitted a report showing that the city was running 137 lights at a cost of $59.42 each per year, not including taxes, water rates, interest or depreciation. Including interest, five per cent. on $35,000, cost of plant, taxes and water rates, 2½ per cent., 10 per cent. depreciation, the cost was $104 per year each lamp, running only dark nights. A short time since, during a thunder shower, the city was left in darkness, because the City Superintendent was afraid of burning out an armature if he ran the lights. A gentleman passing an evening in Bay City recently inquired why they did not have street lights, and the answer was, "We do have them," and sure enough, at 9 o'clock, they started the lights. Still the price charged by electric light companies for first-class service, with lights every night, even when obliged to compete with the rival forces of heaven's batteries, is compared with such service as shown in Bay City.

The city of Bangor claims that the average cost of burning a light each night is 12¾ cents; that is $46.23 per year for each lamp. The electrician is paid $78.50 per month, or $942 per year; his assistant receives $520 per year; one lineman is employed at $624 per year; two trimmers at $1,248 for the year—making $3,334 for wages of these men, being $22.82 per lamp per year. They run all night, requiring double lamps and four carbons for each and every day, calling for 1,460 carbons per year each lamp; for these they pay $13 per thousand, and in addition pay 96 cents per thousand for freight and five cents per thousand for cartage from the freight house, making cost of carbons $14 per thousand, or $20.44 per lamp per year. Allowing $2.97 per year for oil and waste, we find the amount paid by the city for wages, carbons, oil and waste was $46.23 per lamp per year. This is 12¾ cents per lamp per night, just what is claimed as the entire cost to the city for running their lights. The plant cost $35,000, and this does not include anything for water power nor for any portion of construction of the dam or cost of its maintenance, or for the station buildings. Interest on $35,000 at six per cent., $2,100; depreciation on electric apparatus, 10 per cent., $3,500; broken globes during the year, $130; wall controller burned out, costing $160; 15 lamps broken, repairs costing about $300; damage to mast arms, repairs costing $100; repairs at station, $500; also $780 paid for coal. Here is $7,520, which is part of the expense of the electric lights charged to some other department, while to get the true cost there must be added to this the repairs to the dam, interest on the cost of the buildings, wages of an engineer when

engine is used, cost of new brushes and segments; also taxes and water rent, which the city would receive from a private corporation if running the lights, which, at the lowest estimate, would be over $1,000 per year, thus making a total cost to the city of $15,271.86 for running 146 lamps one year, being $104.59 per lamp, and that, too, with water power all the time except for about six weeks.

The favorite place quoted by advocates of municipal ownership is Dunkirk, N. Y. I herewith give the report of the water commissioners of Dunkirk. As a specimen of expert bookkeeping, and a sample of the way accounts are kept by cities, I recommend the plan to all electric light men; for, if you are endeavoring to satisfy your constituents or stockholders that electric lights can be run without money and without price, it cannot be excelled. The report reads as follows;—

PAID ON ACCOUNT OF ELECTRIC LIGHT.

For linemen's salary	$540 00
For fuel	933 24
For supplies	447 60
For labor repairing line	41 42
For repairs on engine and boiler	65 64
For repairs on machinery	99 40
For miscellaneous accounts	14 60
	$2,141 90

"The above statement shows very distinctly that the most sanguine predictions as to the cost of running the electric lights of this city have been more than realized. After a trial of one year and eight months, the machinery and line are in better and more perfect condition than when first started. The cost of our electric light does not exceed one cent per hour for each light."

Here we have a report from the city authorities stating that the entire cost to the city of running 55 arc lights one year was $2,141.90.

You will notice one item is repairs on engine and boiler; also one item for fuel, showing that the plant was steam power, and, what is far better, a style of boilers and engine that ran the entire year, starting and stopping at proper times automatically, without any one to look after them except a man occasionally to make a few repairs—the coal walked into the furnace without assistance, and no one was employed in or about the station, neither did the plant cost the city anything.

Here is a sample of the reports made by politicians and those professed economists, which shows just how reliable they are. Of course, a man of practical experience and knowing that electric lights do not run without human agency, would look further before accepting such a statement, and when we examine the accounts of the water works we find engineers and firemen paid $3,555; supplies, $449; general expenses under superintendent, $995; miscellaneous accounts, $240; superintendent's salary, $720; interest on bonds, $7,025—making $12,984 additional. Even if only one-third of this is charged to electric lights, we have $4,328 to add to the $2,141, making $6,469 for 55 lights, or $117 each per year. Consistency, thou art a jewel!

Chicago, it is claimed, is the center of the world, and the only place on this muudane sphere where mortals can be happy, and where life can be spent without thought of money or the hereafter, because their electric lights only cost $73 per year. We admit that Chicago has triumphantly secured the World's Fair, and is now transposing our national air to "Hail, Chicago! happy land." But they have not yet seen the bills for the electric lights as furnished by the city and used on that occasion. When they do the city electrician will need to add something more to his stereotyped answers that the cost of city lights "does not include any expenses such as you mention—taxes, water rent, interest on investment, insurance, repairs, depreciation or renewal of plant in general," neither will it be expedient to charge the wages of the electric light linemen to the fire alarm telegraph department, notwithstanding it works very nicely now, and helps wonderfully to make the cost of an arc light appear small.

Upon investigation of one of their stations of 275 to 300 light capacity, I find that the chief engineer receives $1,200; assistant, $1,030; four firemen, $2,880; six trimmers, $3,240; line-tester, $720; three linemen, $2,520; cost of carbons, $3,800; fuel, $12,000; interest, $14,000; depreciation, 2½ per cent., $8,750; oil, waste, repairs, globes, taxes, etc., $7,000—making $57,190 a year expense for running 300 arc lamps; being $190.63 per year per lamp, and this makes no provision for salary of electrian, superintendent, or for armatures burned out, or any accidents or damages. With the linemen's wages charged to the fire alarm telegraph department, we can reduce this $2,520. Now, to what other department do they charge the other expenses to reduce it to $78 per year per lamp.

Ypsilanti, Mich., is the Mecca toward which all the advocates of municipal ownership turn their longing eyes, and we are informed that the entire cost of a 2,000-candle power lamp is $23.61 per year, when the truth discloses the fact that Ypsilanti pays $72 per year, only running eighteen nights a month until midnight. Wishing to have the views of the prominent authorities of this wonderfully managed city, the following questions were propounded, and I give both the questions and answers.

Q. 1—With your experience, are you in favor of cities doing their own lighting? A.—No.

Q. 2—Why? A.—Political preferences and frequent changes of management are too expensive. Incompetent engineers, linemen and trimmers kept in place by a committee for political or other purposes; poor carbons, lack of attention generally, grounding of wires, breaking of globes, infringement of patents, constant repairs, etc., make this system expensive and an unknown amount till the year expires. *The wear and tear is immense*, all kinds of complaints and no responsible head is the rule. On the contract plan for light you pay for what you get only, and know what to provide for in the estimate for tax levy.

Q. 3—If your city had the work to do again, do you think they would do the same? A.—No.

Q. 4—Has the municipal operation of your plant met all expectations and requirements? A.—No.

Topeka is another place where electric lights, furnished by the city, are cheaper than sunlight, and the city is jubilant over their purchase. I quote from a letter written by a prominent official of the city of Topeka, which seems to prove that their millennium has not yet arrived. He says: "The agreement for all night lighting was $6 per light per month. We find that the cost of operating the plant, of 184 lights, for all night has been $11 per month. The agreement further provided that lights should be 2,000 candle-power; all the tests we have made does not show them to be over 500 candle-power. Our lights so far have been very unsatisfactory. My own opinion of the matter is that it would be much cheaper in the end for the city to have contracted with some of our electric light companies here to furnish the city with its lights at so much per light. We would then have known, at least, just what they would cost. As it is we have to take our medicine, which is liable to be a very expensive dose. It is a very expensive luxury, and there are so many expenses coming up that we cannot foresee; therefore, I say, when you take everything into consideration, interest on the investment, wear and tear on machinery, dynamos, etc. (the contractors are already building over ours, and they have not run two years yet), consider well before contracting for a plant." Here is the opinion of an honest official who has had experience with a city owning a plant.

Lewiston, Maine, is another brilliant example of municipal ownership. They have a plant of 100 arc lights which cost the city $15,000. They burn, on an average, 24 nights per month on moonlight schedule, and the Mayor says the actual running expenses are $4,200 per year. Add interest on cost of plant, depreciation, five per cent., taxes, rent of water power which the city would have received from a private company, therefore it is costing the city for 100 arc lights, using water power, $7,200, or $72 per lamp per year, while the local electric light company offered to furnish the same lights for $5,760, being $1,440 less than it costs the city to run their own lights; and still it has been advertised broadcast that the cost of arc lights in Lewiston was only 14 cents per night.

I have secured reports from 50 municipal plants, embracing nearly all the cities and towns in the United States owning plants, and find that the cost of these has been $1,511,225; that they are using 3,725 lamps; 12 places running all night and 38 until midnight or on the moonlight schedule; that the average price paid for coal is $2.34 per ton; that the actual running expenses have been $251,194; that the interest on the cost of these plants is $90,691; depreciation at five per cent., $75,576; cost of replacing armatures actually burned out, $12,000; taxes city would have received from private corporations if they had furnished the lights, $15,715—making the total expense to these 50 cities, of burning 3,725 lamps (two-thirds of them only until midnight), for one year, $444,486, or an average cost $119.24 per lamp per year. In the figures going to make up the cost of plants and the running expenses I have taken the statements and amounts as given by the city officials, but when we are told that the total amount paid for a complete plant of 68 arc lamps, with engines, boilers, dynamos, etc., was only $1,300, and informed that the total running expenses of a plant that cost $12,000 are only $1,100, and in the same communication the statement is made that they pay their engineer and linemen $125 per month, making an annual bill for these men's wages of $1,500, we naturally long for the secret which enables them to settle this amount and pay for repairs, oil, coal and other expenses with an expenditure of only $1,100.

I have statistics from 365 electric light companies furnishing 35,100 arc lamps for street lighting, three-fifths burning their lights all night, and two-fifths burning until midnight, or on the moonlight schedule. The average cost of coal is $2.76 per ton. The average price charged per lamp for street lights is $118 per year. This is the price when furnished by electric light companies who have assumed all the risks and liabilities incurred in the business, and who must furnish first-class lights. This is the cost with lights burning every night without a break, as the contract calls for, and necessitating a rebate if lights are out, which would reduce the price paid by the city.

Only one-third of the cities owning plants run them all night, while of street lights furnished by private companies three-fifths burn all night. Lamps all night and every night would burn 4,000 hours per lamp, while the moonlight schedule would only require about 2,100 hours per lamp. The cost to companies, of course, is much more for all night lights than it is until midnight, and had lights run by municipal plants been burned the same length of time as lamps furnished by private corporations, the average cost would have been still more, as lights must have burned about twice as many hours.

It will be noticed that the average cost of coal used by municipal plants was $2.34 per ton, owing to the fact that the majority were located near the mines or places where coal was cheap, and the average, as shown for electric light companies, is $2.76 per ton, owing to the fact that coal was transported long distances at high rates of freight. Even with this factor against them, it shows conclusively that private corporations are furnishing cities with lights for less money than they can themselves produce them while owning the plant. This, too, with the expense of operating city plants figured as given by the various cities, which their own report shows is incorrect, and less than actually paid.

It is well known that if a private corporation is furnishing municipal lights, when they are out for a short time or are not up to standard, a rebate has to be made, amounting in the aggregate to many thousands of dollars; but you will never see this item deducted when advocates of municipal control are quoting the cost of lights. Neither do they allow the fact of the city's liability for damages and accidents to be developed. If the municipality own the plant they assume these chances, and here is a feature of responsibility which in most States rests upon the individual as well as the city. The property of any citizen can be held for an execution against the town for injuries caused by a municipal plant, no matter if it amounts to thousands of dollars, and thus he might be deprived of his most valuable personal rights and liberties. If electric light companies furnish the lights, they must meet such claims and protect the city from loss, and the court records show that electric light companies have paid heavy damages on this account.

In the reports received from city officials regarding the cost and operation of their lights, one says: "No expenses charged to lighting account." Again: "Lights are not started for an hour after dark." Many say: "Whenever a thunderstorm approaches lights are shut down and city left in darkness." Another says: "Have not had lights for past two weeks, owing to some trouble at station;" while many report wages of employés charged to water department, and others that no account of lighting expenses is kept. Here we have the basis upon which reports are made that the cost to cities owning plants is so much less than it is when private corporations furnish them, simply deceiving the taxpayers by charging part of the cost to other departments, while raising a hue-and-cry about the extortion of electric light companies.

No sane or fair-minded man will, with the corruption and fraud practiced by politicians at the present day, attempt to prove that it is for the best interest of the taxpayer to place faith in the honest or conservative management of any enterprise which can be manipulated in the political arena for the advancement of the men in power. The histories of New York, Philadelphia and many other cities are samples of such methods and their purifying effects upon politics. Hypothesis and theory may do on paper, but actual results obtained by practical application and experience are the only reliable data upon which to base any statement relating to the cost of street lighting. In every case these have shown, where all the facts are given, that it has been for the best interest of the citizens and taxpayers to contract with an electric light company for lighting the streets of any city.

Many cities have found by actual experience, after spending a large amount of money, that this is a fact. The city of Greenville, S. C., has sold out its municipal electric lighting station, the purchasers agreeing to relieve the city of all pending liabilities in connection with the light plant. The city have agreed to pay $100 per year per lamp for not less than 40; the agreement to run for 15 years. Negotiations are pending in several other cities for a sale of their plants to the local or private electric lighting company, as they have found it was impossible to produce the light, when managed by politicians with no interest in the business, as cheaply as could be done by a private corporation whose managers were financially interested in its success.

There is another feature of this business that it is well to consider. Under the authority and sanction of the legislatures of the States, private capital amounting to millions of dollars have been invested in the enterprise of electric lighting. The benefit that municipalities have received from this capital is enormous, and it is a question whether the private capital thus locally invested under the sanction of the State can be jeopardized and endangered by the action of municipalities, who are subject to and under the control of the State. In England this matter is fully settled, and no municipality can operate its own plant, if by so doing it will interfere with any local or private company authorized by Parliament.

Judging the future by the past, with the mighty strides that have been made in electrical inventions, two years from now the entire apparatus at present owned by municipalities may be consigned to the scrap pile, and necessitate a new outfit costing thousands of dollars. What is to be done in this case? Levy another tax or issue more bonds, and thus load the city with more debts. Electric light companies have already had this experience, and I can cite a case where the company paid $4,500 for their dynamos, and, after a little over two years, could only realize $300 from those same machines. Why is this? Simply that improved plans and apparatus have been discovered which reduces the cost of producing electricity, and unless companies can control these new patents they will be stranded in the race of invention.

Consider, then, for one moment, the effect upon the business world, if to-day it were possible to blot out electricity and electric lights, with all their conveniences, comforts and luxuries; to stop the progress and development of this wonderful science, and shroud America in a gloom that could only be expressed by Byron when he "had a dream which was not all a dream," and

"The bright sun was extinguished,
And morn came and went—and came—and brought no day,
And all hearts were chilled into a selfish prayer for light.
The rivers, lakes and ocean all stood still,
And the clouds perished. Darkness had no need
Of aid from them—she was the Universe."

The Chairman then announced the Committee on "The Proper Classification of the Lighting Power of Incandescent Lamps," which was as follows: A. V. Garratt, New York; Louis Bell, New York; P. H. Alexander, New York.

Mr. Francisco's paper was opened for discussion.

Mr. Wilmerding moved that a vote of thanks be extended to Mr. Francisco for his excellent paper.

Mr. DeCamp suggested that a lasting compliment could be paid Mr. Francisco by having his paper printed and widely distributed, and offered to stand the expense himself if necessary.

Mr. DeCamp continued by saying that he thought the advocacy of municipal ownership of electric light plants originated with the politicians, who desired to add another plum to the public pudding so that they could pluck it. This alliterative sentiment met with hearty approval.

Judge Armstrong, of Camden, N. J., followed with remarks in a similar strain.

Professor J. P. Barrett, city electrician of Chicago, stated that while cities who owned their own electric light plants published tabulated statements of the cost of running the same, he had never seen such a document from a private electric lighting corporation. The substance of his concluding remarks was that he advocated municipal ownership.

Mr. A. V. Garratt, of New York, thought that in this matter the central station men were confronted by a condition of things and not a theory. Theoretically a city could run its own station economically, practically it could not.

Mr. DeCamp replied to Professor Barrett by stating that he did not think it was necessary for an electric lighting company to publish such a report as the gentleman had referred to. That was a matter in which only the stockholders were interested.

Mr. Duncan was of the opinion that there

was as large a percentage of honesty among city officials as in the National Electric Light Association.

Mr. W. J. Hammer, of New York, gave some interesting facts regarding the establishment of two experimental electric light plants in Paris by the municipal government.

The discussion was prolonged by the remarks of Messrs. Barrett, Alexander, T. Carpenter Smith, DeCamp and Faben.

Mr. George S. Bowen, of Chicago, approved the proposed plan of printing Mr. Francisco's paper for distribution, and said he would stand his share of the expense incurred in publishing 15,000 or 20,000 copies. Voted to publish the paper.

Dr. A. F. Mason, of Boston, chairman of the Committee on Resolutions, then made a report upon the resolutions sent to the committee on the previous day regarding the appointment of a committee of five to represent the National Electric Light Association at the World's Fair, and in regard to endorsing Professor Barrett as electrician of the World's Fair.

The first-named resolution was referred back to the Convention with the approval of the committee, and the Chair put it to vote.

Mr. Charles A. Brown moved the report be accepted. Seconded and carried.

The committee referred back the second resolution to the Convention without any suggestion. Mr. P. H. Alexander, seconded by Judge Armstrong, moved to table the resolution. Dr. Mason asked to be allowed to explain that, as it happened, each member of the committee had individually endorsed Prof. Barrett, as had a large number of those present, and they did not think it lay in the province of the Association to endorse any one. This was in accordance with opinions expressed on the floor yesterday.

Mr. Alexander said that a great many of those present had signed a petition to place Prof. Barrett in the position, but others had not. Now, if the Association endorsed the resolution, it would put these last named members on record contrary to their individual actions.

Mr. Duncan rose for information as to whether there was a precedent to which to refer the present case.

The resolution was put to a vote, but the Chair was unable to decide *pro* or *con*.

Mr. Alexander moved for a roll-call. Seconded and carried.

Mr. Brown moved to amend Mr. Alexander's motion by tabling the resolution and bringing it up at the next session of the Convention.

Judge Armstrong rose to a point of order.

The roll was called by Secretary Foote for a vote on Mr. Alexander's motion to table the resolution.

Mr. Garratt challenged the roll-call. He wanted to know whether a member could vote both as a representative of a corporation and as an individual member, as two gentlemen had done. Messrs. Brown and DeCamp thought the point was well taken, and asked for a reference to the constitution.

Mr. Weeks, one of the gentlemen whose vote was in dispute, said that the matter had been referred to the Committee on Credentials, who had agreed to let the matter stand as heretofore, that is, allow both votes. Nevertheless the two votes in dispute were withdrawn.

The Secretary then read the vote as corrected: 26 ayes, 17 noes. Mr. Alexander's motion to table was, therefore, carried.

Mr. DeCamp, at 1.15 P. M., moved to adjourn. Seconded and carried.

AFTERNOON SESSION.

The afternoon session was not called to order by the President until 4.40. The first matter on the order of business was the topic "Value of Details in Electric Light Stations," which had been left over from the morning session. The discussion was opened by Mr. A. J. DeCamp, of Philadelphia, who thought that electric light stations suffered considerable losses from miscellaneous items of expense. He stated that a saving of 50 per cent. in carbons alone could be effected by adopting a system of accounting for them by the inch. Thorough discipline among employés was invaluable. The most important item in the operation of an electric light station was labor. He thought there would be a saving of 25 per cent. in the payroll if every minute of the employés time were kept track of. He explained several systems in operation by his company which had led to increased economy in the operation of their plant. He favored graduating a scale of prices depending upon the length of contracts entered into with customers, and suggested that no contract be made for less than six months' service. The discussion was continued by several other gentlemen, among whom were Messrs. Wilmerding and Weeks.

Mr. Lufkin's paper on "The Proper Basis for Determining Electric Motor Rates," was read, in the absence of the author, by Mr. Joseph Wetzler, of New York.

In the discussion which followed Mr. Wirt, of Chicago, thought that Mr. Lufkin had been a little too favorable to the gas engine. Messrs. Garratt and Faben also joined in the discussion. Dr. Bell told of some English tests on gas engines, where the minimum expenditure of gas was 20 feet per horse-power hour, with an allowance of five feet of gas for oil used. Mr. Weeks suggested that Vice-President Edgar, of Boston, had had large experience with motors, and that those present would be glad to hear from him.

Mr. Edgar responded briefly but interestingly, stating that his company sold current to motor users by meter at so much per horse power hour.

Mr. H. M. Swetland's paper on "Standards of Economy in the Generation of Power" followed:

"STANDARDS OF ECONOMY IN THE GENERATION OF POWER," BY H. M. SWETLAND.

In suggesting to our secretary the subject for this paper as one which would be of vital interest to the members of this Association, I had no idea that I should be called upon to prepare and present it, nor do I feel the fitness of my being chosen to instruct the gentlemen of this Convention, whose knowledge upon these matters is the epitome of the best and highest accomplishment of the times.

The above title scarcely represents my treatment of the subject. I should prefer rather to call it "A plea for the collection and record of data for standards of economy."

In old and long-established lines of work such would naturally be unnecessary. In the electric light business, where so much is new and development is so constant and rapid, it is essential that there should be established some authentic form of comparison of operations with the view of reaching the greatest economy in the shortest possible space of time. Further, in view of the rapidly changing conditions under which the generation of steam power is being operated, the concentration of small and individual plants into larger centres, etc., it becomes of the utmost importance that a careful and detailed system of standards shall be inaugurated and maintained.

Although far more able representatives than myself have heretofore approached this topic, there has been in the Convention a noticeable lack of definite, reliable, uncontrovertible information in this special direction.

The subject of economy in general has received the attention of our best thoughts, but it has been directed to the operations of the complete system, and too often details of definite expense are overlooked by the superintendent, whose imperative duty is the running of the plant, not its most economical methods. He is obliged to keep a station in smooth running order to furnish good, steady, reliable lights under pressure of constant demand, in which case economy is not the first consideration.

At the last Convention the admirable paper read by Mr. T. Carpenter Smith, of Philadelphia, entitled, "A System of Central Station Accounts," touched upon and almost comprehended this necessity, but he still further included the maintenance of outside equipment, whereas my paper is confined to the question of first cost of production of power expressed in pounds of fuel per developed horse-power per hour.

The material for the data in furnishing standards of economy should naturally be the practical results of actual operations compiled in tables from the results obtained by different managers. To what end? They would interest and benefit all desirous of investing in electric light and power enterprises, which are becoming such an attractive feature in the financial world. They would be useful to prevent the establishment of unnecessary and injurious competition, frequently induced by statements of facts and figures showing an utterly false and unattainable economy.

But to the superintendent of the station, more than any other person, these tables would be of paramount importance. They would enable him at a glance to learn what others are actually accomplishing under certain named conditions, and readily to institute comparisons with his own records. By their use he would not only gain enlightenment on many points, but be stimulated to the highest possible degree of efficiency and economy. He would also thus be furnished with unimpeachable authority to offer a doubting stockholder or too exacting president, who, while perhaps not being initiated in the details of practical workings, is always glad to be reassured by accurate information.

These tables would not, however, be found elastic enough to suit the purpose of the energetic boomer whose object in building a station is sale, not operation, for they will be found to show the necessity of the best modern appliance to the most economical production of power. Neither would they be particularly interesting reading to men who trade in inferior appliances.

A "standard of economy" is obtainable only by a combination of mechanism best adapted to the conditions and attendance which can secure from this mechanism the best possible results. A plant may be equipped with the most improved devices, the excellence of which may be practically nullified by neglect of well-known duties, ignorance or mismanagement. A poor gun in the hands of a good soldier is a better combination than a good gun in the hands of a poor soldier. It is not the machine alone, but combined with the skillful man behind it that works out the best results.

This point was splendidly taken by Mr. Geo. H. Babcock in his most valuable paper on "Boiler Economy," read before us in Kansas City. We all remember his allusion to "boilers and brains," or the "co-efficient of common sense."

It is perhaps superfluous to mention that results obtained with different existing equipment and attendance vary fully as one to five, with a possibility of the still further lowering of the former proportion by investment in still better equipment, constructed by still greater skill, managed and operated throughout by superior intelligence, and yet these proportions, which to-day show such wide results in fuel consumption, may, by the combination of intelligence, energy and care, be made to show results more nearly proportioned to the possibilities of the present equipment by placing on record the best results obtained from a similar system.

Of course, no absolute standard or unit of economy can be established by a vote of convention or fiat of association. A yard stick is a yard stick, an inch an inch, but a standard of economy must always vary in greater or less degree according to conditions and equipments.

Yet a sufficient similarity exists to enable us to prepare tables covering the main types of equipments, and the recorded performance of any special type would be relied upon and regarded as a standard.

Human ingenuity, talent, patience, skill and incessant labor are being exerted every day and hour in the direction of lowering the records. The ambition of the day is turned towards producing the maximum of result with the minimum of expenditure.

Standing in comparison with the 15 minutes of the ocean racer, the second clipped from the tables of the turf, or the extra grain made to yield from the refractory ore, is the ounce of fuel measured in the economic generation of power when considered on the large and increasing scale of commercial enterprise.

My plea is for the most minute and detailed system of tabulation as the means of reaching the best results. It is by the comparison of coal with coal, boiler with boiler, engine with engine, type with type, appliance with appliance, that these results may be obtained. Those who have had experience in collecting data of the kind required will comprehend at once the difficulties encountered in the process of getting information which shall fully cover the many important points in the case.

Not only should there be no objection on the part of the companies, their managers or superintendents, to giving information that is reliable in character, accurate in detail, and comprehensive in scope, but there ought to be most cheerful acquiescence.

We are organized for purposes of free interchange of thought and experience, with a view to mutual advancement and benefit. In these tables each one is liable to discover information upon some important point which would be of great value to him. Naturally the broad ground of justice, fairness and liberality of feeling is expected to be our starting point.

If I have succeeded in interesting the gentlemen in the importance of "collecting data for these standards," I will feel justified in having consumed the time of the Convention. If carried out we will reap the benefit in having on record the facts and figures which have been so often called for; and the answer to the three great questions, What is your equipment? How many lights do you furnish? How much coal do you burn?

The Chairman then suggested that Mr. E. F. Williams, of Beloit, Wis., read his paper, and that both his and Mr. Lufkin's papers be discussed at once.

Mr. Williams then took the floor and said that lack of time had prevented his preparing a written address on "Triple Expansion High Speed Engines for Central Station Work," as he had intended. He substituted some interesting extempore remarks, however, stating that the cost of such engines was about 20 per cent. greater than ordinary compound engines, but that the former saved about 20 per cent. in fuel, and that in many instances the triple expansion engine saved its extra cost in about a year.

Mr. Garratt moved that the Committee on Data be instructed to report at the next Convention on the cost of power in this country. Seconded by Judge Armstrong and carried.

Very little discussion followed, and the President called for the report of the Committee on Revision of Constitution. This was presented by the chairman, Mr. Francisco.

In behalf of the committeee Mr. Francisco offered this resolution:

Resolved, That the report of the Committee on the Revision of the Constitution be accepted and adopted, to take effect January 1, 1891.

The President stated that the report would stand without discussion until to-morrow, Thursday, at 11 A. M.

Dr. Mason was of opinion that no action could be taken on an amendment to the constitution on the same day it was presented, nor, in fact, until the succeeding Convention. He rose for information.

Judge Armstrong argued that this was not an amendment but a total revision, and, therefore, could be acted upon.

Dr. Mason asked for a ruling from the Chair, to which the President replied that the provision to which Dr. Mason referred was adopted to prevent rushing through an amendment, and that the spirit would be obeyed by laying over the discussion until to-morrow.

Mr. Duncan moved that the report be received, and that the hour of 11 A. M. Thursday be set for a discussion of the revision seriatim. Seconded and carried.

Secretary Foote announced for the Entertainment Committee that a programme of music and dancing had been arranged for the members in the evening, from 9 to 11 o'clock.

At 6.35 P. M. it was moved and seconded to adjourn. Carried.

THURSDAY, AUGUST 21ST, 1890.

FORENOON SESSION.

President Perry called the morning session to order at 11.10. The following breezy dialogue occurred between Prof. J. P. Barrett, of Chicago, who took exceptions to Mr. Francisco's paper on "Municipal Lighting," and the president.

Mr. Barrett: Mr. President, I rise for information. Will you consider my point?

The President: Yes.

Mr. Barrett: My understanding is that this report by Mr. Francisco was ordered to be published by the Association, to be distributed among the various cities of the country. Am I right?

The President: You cannot re-open that subject. The fact is that it was ordered published, but you cannot re-open the subject for discussion.

Mr. Barrett: I do not want it discussed. I simply ask for information.

The President: Yes.

Mr. Barrett: I want to ask the gentleman who wrote this paper how he secured those figures?

The President: I shall rule that out. We cannot start in on that now. That might take half an hour.

Mr. Barrett: I beg your pardon; I am simply asking a privileged question.

The President: I shall rule against it.

Mr. Barrett: He can answer that in a moment.

The President: I shall rule against that. We cannot go on in that way, for we all know just where it will lead to. We have a special order of business for this hour, and we must pursue it.

Mr. Barrett: May I ask this question?

The President: You asked the Chair for information, and I have given it. We cannot pursue that line further. We must now begin the special order of business.

Mr. Barrett: Will I have the privilege of asking this question?

The President: Yes; at the proper time.

Mr. Barrett: He can answer it now. It will not take half a minute.

The President: Mr. Barrett, will you take your seat?

Mr. Barrett: I shall be glad to do so, but here is an untruthful statement.

The President: Will you please take your seat?

Mr, Barrett: I shall do so.

The President: Then take it now.

Mr. Barrett: May I not have an answer to this question?

The President: Will you take your seat without any further procedure? Your question can be answered at the proper time.

Mr. Barrett: I would like to have that question answered, but I will take my seat.

The President: Then do so, please. I told you that at the proper time you should have an opportunity to ask that question, but not now.

Mr. Barrett: I beg your pardon. I did not understand that to be the case. You ruled me out of the discussion; I simply asked for information, and if I cannot have it I want the Convention to so understand it.

The special order of business set down for 11 o'clock was the consideration of the report of the Committee on the Revision of of the Constitution, and was then taken up. It was decided that the report be taken up seriatim and discussed. No trouble was met with until Article III, Section I, came up, when Dr. A. F. Mason, of Boston, offered a resolution designed to test the sense of the Convention as to whether associate members should be retained or not. He moved for two classes of members, active and honorary. After a hot debate, which lasted about an hour, it was unanimously voted to retain associate members.

Then a protracted discussion as to the privileges of associate members ensued. Finally Section III, Article III, of the committee's report was made Section II, same Article, and amended to read as follows:

"Associate members shall be electricians, electrical or mechanical engineers, manufacturers, corporations and individuals who are otherwise directly or indirectly interested in advancing the use of electricity, and shall have the right of attending all meetings of the Association except executive sessions, and shall have the right to discuss papers read before the Association."

In Section I, Article III, the following was stricken out: "And take part in the deliberations of the Convention."

The Constitution and By-Laws as finally adopted are as follows:

ARTICLE I.—NAME.

This Association shall be entitled the National Electric Light Association.

ARTICLE II.—OBJECT.

The object of this Association shall be to foster and protect the interests of those engaged in the commercial production of electricity for conversion into light, heat or power.

ARTICLE III.—MEMBERSHIP.

SECTION I.—Members shall be divided into three classes—active, associate and honorary. Active members only shall be entitled to vote, and shall be corporations or individuals engaged in the business of producing and supplying electricity for light, heat or power for commercial or public use.

SEC. II.—Associate members shall be electricians, electrical or mechanical engineers, manufacturers, corporations and individuals who are otherwise directly or indirectly interested in advancing the use of electricity, and shall have the right of attending all meetings of the Association except executive sessions, and shall have the right to discuss papers read before the Association.

SEC. III.—Honorary members shall include those already elected as such, and such other persons as may be elected upon the unanimous recommendation of the Executive Committee and approved by a two-thirds vote of the Association.

SEC. IV.—In the case of a corporation, the membership may stand in the name of the company, and such company shall have the right to be represented at any meeting of the Association by any of its officers or directors, or by its regularly employed manager or superintendent.

SEC. V.—No individual actively associated with a corporation holding an active membership shall become an active member individually, unless he shall own or operate a central station plant individually.

ARTICLE IV.—OFFICERS AND EXECUTIVE COMMITTEE.

SECTION I.—The officers of the Association shall be a president, two vice-presidents, an executive committee of nine members, and a secretary and a treasurer, who shall be elected as specified in this Constitution.

SEC. II.—The president and vice-presidents shall be elected to serve one year from the first of the month following the date of their election, and shall be active members. The president shall act as chairman of the executive committee during his term of office. He shall not be eligible to re-election for two years after his first term has expired.

SEC. III.—The executive committee shall be chosen from among the active members. The first executive committee elected after the adoption of this Constitution shall be divided into three classes. Class one shall serve for the period covered by three conventions, class two for two conventions, and class three for one convention, from the first of the month following their election, after which three members of the committee shall be elected at each Convention, to serve for three succeeding conventions from the first of the month following their election.

SEC. IV.—The offices of secretary and treasurer may be filled by the same person. He shall not serve as a member of any committee; shall be eligible for re-appointment and election without limit; shall give a security bond in such sum and with such qualifications as the executive committee may determine from time to time, and shall perform such duties as said committee may direct, subject to their approval.

SEC. V.—The secretary and treasurer shall be nominated by the president and ratified by the executive committee. He shall serve for one year from the first of the month following the date of the president's election. He may be an active or associate member.

SEC. VI.—The executive committee shall be the governing body of the Association, and shall manage its affairs, pass upon all applications for membership, subject to this Constitution and all such special rules or regulations as may be adopted by the Association from time to time, and five members of the committee shall constitute a quorum.

ARTICLE V.—MEETINGS.

The annual meetings of this Association shall be held in February, and a semi-annual meeting may be held in August of each year, at such places as the Association shall determine, and on such dates as may be determined by the executive committee.

ARTICLE VI.—QUORUM.

Fifteen active members of the Association shall constitute a quorum for the transaction of business.

ARTICLE VII.—DUES.

The annual dues of active members shall be $25 and associate members $20, payable in advance, and shall cover the calendar year. Members in arrears for dues shall not exercise the privileges of membership. Any member in arrears for one year's dues shall be dropped from the rolls, and if he is reinstated he will be required to pay his dues for the year in which his membership lapsed.

ARTICLE VIII.—ELECTION OF OFFICERS.

All officers, except the secretary and treasurer, shall be elected by ballot at the annual meeting of the Association. Vacancies in office may be filled by the executive committee to cover the term until the next annual meeting of the Association.

ARTICLE IX.—PERMANENT OFFICE.

A permanent office of the Association shall be established in the city of New York, and shall be located, furnished and governed in such a manner as the executive committee may from time to time determine.

ARTICLE X.—PARLIAMENTARY RULES.

Roberts' Rules of Order shall be the governing parliamentary law of the Association in all cases not definitely provided for by this Constitution.

ARTICLE XI.—VOTING AND PROXIES.

SECTION I.—The roll-call shall be ordered on the demand of 10 members on any question before the Association. Unless ordered otherwise, as specified in this Constitution, all voting shall be by voice.

SEC. II.—Voting by proxy shall not be allowed at any meeting of the Association or any of its committees.

ARTICLE XII.—AMENDMENTS.

SECTION I.—Amendments to this Constitution shall be presented in writing, and shall be referred to a committee to be elected by the Association before being acted upon. A two-thirds vote of all members present, entitled to vote, shall be necessary for their adoption.

SEC. II.—No amendment shall be voted upon by the Convention at which it is introduced.

The meeting adjourned at 2.15 P. M., to meet at 3.30.

AFTERNOON SESSION.

The opening hour for the afternoon session had been announced as 3.30, but it was 3.55 before business was commenced.

President Perry named the committee to represent the National Electric Light Association at the World's Columbian Exposition at Chicago, as follows: P. H. Alexander, S. J. Hart, G. H. Rowe, and Mr. Edwards.

The report of Secretary and Treasurer Allen R. Foote was next called for. It was as follows.

SECRETARY'S REPORT.

Active members who have paid their dues	79
Active members who have not paid their dues	28
Total active members	107
Associate members who have paid their dues	128
Associate members who have not paid their dues	34
Total associate members	162
Total number of members on July 1, 1890	269
Total number of members on Jan. 1, 1890	259
Gain in membership in six months	10

TREASURER'S REPORT.

RECEIPTS.

Balance on hand Jan. 1, 1890	$610 17
Received to July 1, 1890	3,020 00
	$3,630 17

EXPENDITURES.

January 1 to July 1 as per vouchers	$2,396 57
Balance on hand July 1	1,233 60
Total amount accounted for	$3,630 17

It was moved by Mr. Garratt and seconded that the report be received and spread upon the minutes of the Association. Carried.

The report of the committee to take action on the death of Mr. Miles W. Goodyear was read by the chairman of the committee, Mr. Garratt.

Mr. Seeley moved that the report be accepted and that the committee be discharged with thanks. Carried.

The Executive Committee made no written report, but the chairman, Mr. Huntley, stated that the committee had had frequent meetings, of which the secretary had the records. He asked that the work of the committee and this verbal report be received, which was done.

President Perry announced his selection of a committee on nominations for the executive committee and time and place of next meeting to be as follows: Messrs. Edgar, Armstrong, Alexander and DeCamp. As Mr. Edgar had gone back to Boston, Mr. T. Carpenter Smith was named in his place.

Mr. John A. Seely, of New York, made the report as chairman of the Committee on Finance. The books had been audited and found correct, but it was noted that the account had been kept on a single entry system. The committee recommended that the secretary be instructed to open a new set of books to be kept on the double entry system. The report was accepted as a portion of the Executive Committee's report.

The report of the Committee on Relations between Manufacturing and Central Station Companies was read for the chairman, Mr. Marsden J. Perry, by Judge Armstrong.

Mr. C. A. Brown moved that the report be accepted and the committee continued as they requested. Carried.

Mr. A. J. DeCamp on behalf of the Committee on Data asked that the committee be continued. Moved and carried.

The topic, "The Proper Care and Management of Alternating Currents," discussion to be opened by Mr. T. Carpenter Smith, was next announced. Mr. Smith stated that he had been requested to prepare a paper on this subject for the next Convention, and was not ready to begin the discussion.

"How can the National Electric Light Association best serve the interests of central station companies?" was the subject of the next topic discussed by Mr. C. R. Huntley, of Buffalo. He stated that when he was asked to discuss this question he felt inadequate to the task and still felt that way. He thought it ought to be discussed in the converse, "How can the central station companies best serve the interests of the National Electric Light Association?" He had very few comments to make, and would close by stating that in his opinion the National Electric Light Association ought to be a purely business organization.

The Committee on Nominations then reported through Mr. T. Carpenter Smith. The committee unanimously were in favor of holding the next convention at Providence, R. I., the date to be announced later. They thought it was due to the members of the present Executive Committee to continue the same with thanks for past services, and therefore re-nominated the whole committee with the exception of the substitution of the name of Mr. A. J. De Camp for that of Mr. Thurber, which had been done by request.

Mr. Seely moved that the report of the committee be accepted and the committee discharged. Seconded and carried.

Mr. DeCamp moved that the Secretary be instructed to cast the ballot for the Executive Committee. Seconded and carried.

The Secretary did this, and announced the committee: C. R. Huntley, chairman, E. R. Weeks, C. H. Wilmerding, J. J. Burleigh, M. J. Francisco, J. A. Seely, James English, A. F. Mason and A. J. DeCamp.

The President called for remarks on the subject of the place for holding the next Convention. Every one seemed satisfied, and it was moved, seconded and carried that Providence, the place recommended by the committee, be accepted.

Mr. Seely, at 4.35, moved to adjourn the Convention. Seconded and carried.

THE ATTENDANCE.

Allegheny, Pa.—A. Groetzinger.

Altoona, Pa.—H. E. Heller.

Ansonia, Conn.—F. B. Platt.

Atlanta, Ga.—John S. Alfred.

Boston, Mass.—G. L. Austin, F. E. Barker, S. E. Barton, Capt. Wm. Brophy, A. N. Burbank, Col. Louis W. Burnham, C. L. Edgar, F. E. Cabot, Wm. W. Castle, H. J. Conant, H. E. Duncan, H. H. Eustis, H. M. French, A. V. Garratt, C. M. Goddard, L. H. Hart, J. R. Lovejoy, A. F. Mason, E. C. North, A. C. Shaw, R. F. Ross, F. E. Pettingell, R. T. White, E. F. Woodman.

Bridgeport, Conn.—W. C. Bryant, J. M. Orford, H. D. Stanley, O. S. Platt.

Bristol, Pa.—Chas. E. Scott.

Brooklyn, N. Y.—E. F. Peck.

Buffalo, N. Y.—C. Lee Abell, C. R. Huntley, W. H. McDonald.

Chicago, Ill.—W. P. Adams, J. P. Barrett, John W. Blaisdell, Chas. A. Brown, E. V. Cavell, Geo. Cutter, J. W. Dickerson, Fred. Degenhardt, Henry C. Eddy, C. E. Gregory, W. A. Kreidler, Geo. A. McKinlock, Geo. B. Pennock, E. L. Powers, J. W. Shay, J. H. Shay, H. H. Small, Gilbert M. Smith, Ed. F. Williams, C. H. Wilmerding, H. S. Winston, F. A. Wunder, John Young.

Camden, N. J.—Hon. E. A. Armstrong, J. J. Burleigh, C. L. Rodman, Heber C. Robinson.

Cleveland, Ohio.—C. C. Curtis, W. B. Cleveland, J. B. Crouse, Benj. F. Miles.

Colorado Springs, Col.—E. C. Wade.

Dallas, Texas.—W. M. Clower, C. O. Harris.

Detroit, Mich.—Jessie M. Smith, Fred Whipple, W. H. Fitzgerald.

Elgin, Ill.—G. S. Bowen.

Fitchburg, Mass.—H. F. Coggshall.
Flint, Mich.—A. G. Bishop.
Ft. Wayne, Ind.—W. R. Kimball, M. M. M. Slattery.
Hartford, Conn.—W. G. Halm, C. L. Tolles, Francis P. Whiting.
Kansas City, Mo.—M. E. Bates, G. W. Hart, Geo. H. Hegeman, E. R. Weeks.
Montreal Que.—A. J. Corriveau.
Newark, N. J.—C. O. Baker, Jr., Chas. McIntire.
New Bedford, Mass.—Chas. R. Pine, Mr. Underwood.
New Britain, Conn.—T. H. Brady, L. C. Whitney.
New Orleans, La.—S. J. Hart.
New Haven, Conn.—J. English, C. I. Hague, C. D. Warner.
New York.—P. C. Ackerman, F. M. Adams, P. H. Alexander, C. H. Barney, Oliver A. Brown, L. D. Beck, Dr. Louis Bell, Wm. Bracken, Edward Caldwell, Capt. W. L. Candee, Stephen L. Coles, Francis B. Crocker, W. F. Cullen, C. J. Field, G. H. Fisher, Wilfrid Fleming, A. R. Foote, R. E. Gallagher, E. T. Greenfield, J. W. Godfrey, R. J. Gray, W. H. Gordon, Wm. J. Hammer, Geo. H. Hartwell, H. M. Haines, W. J. Jenks, E. H. Johnson, W. J. Johnston, Jas. F. Kelly, Theo. Larbig, A. B. Laurence, H. Ward Leonard, E. W. Little, H. W. Lufkin, Gen. O. E. Madden, J. P. McQuaide, Frank A. Magee, Geo. T. Manson, T. C. Martin, Geo. H. Meeker, T. McCoubray, W. J. Morrison, E. Myerson, C. McL. Paine, Geo. M. Phelps, Geo. B. Prescott, Jr., Chas. W. Price, S. Rosenstamm, R. W. Ryan, John A. Seely, L. W. Serrell, Ralph L. Shainwald, H. L. Shippey, C. W. Spear, J. R. Stagg, H. L. Storke, C. E. Stump, H. M. Swetland, Robert Taber, J. B. Taltavall, Wm. H. Temple, J. Von Gestel, C. S. Van Nuis, F. Warder, Benj. R. Western, Jean A. Wetmore, Jos. Wetzler, Schuyler S. Wheeler, G. L. Wiley, Harry W. Williams, F. P. Wisner, E. E. Wood, C. G. Young.
North East, Pa.—A. L. Daniels.
Orange, N. J.—Chas. Wirt.
Philadelphia.—Henry N. Almy, C. A. Bragg, David Brooks, A. Bournonville, H. A. Cleverly, D. O. Conner, W. A. Drysdale, A. J. DeCamp, F. H. Deacon, W. F. Hanks, Wm. Hazelton, W. R. Hood, Norman Marshall, W. McDevitt, W. C. McIntire, Alfred F. Moore, Geo. F. Porter, O. D. Pierce, H. S. Smith, T. C. Smith, W. A. Stadelman, W. H. Shoemaker, G. A. Wilbur, Elmer G. Willyoung.
Pittsburgh, Pa.—H. L. Angloch, S. A. Duncan, A. E. Carrier, J. W. Marsh, Morris W. Mead.
Plantsville, Conn.—H. C. Roberts, J. R. Stagg.
Pottstown, Pa.—Chas. E. White.
Pt. Huron, Mich.—W. F. Davidson.
Providence, R. I.—Marsden J. Perry, Geo. H. Wood.
Rutland, Vt.—M. J. Francisco.
San Francisco, Cal.—Geo. H. Roe.
St. Louis, Mo.—Robt. McMath, C. C. Moffitt, Russell Parker, D. R. Russell.
Toledo, O.—C. R. Faben.
Trenton, N. J.—F. A. C. Perrine.
Waterbury, Conn.—A. M. Young.
Wilmington, Del.—H. B. Cobb.
Windsor, Conn.—M. E. Baird, A. D. Newton.
Washington, D. C.—F. W. Royce, A. M. Renshaw.
Worcester, Mass.—H. M. Smith.

A list of ladies accompanying members of the National Electric Light Association follows:

Mrs. A. M. Young, Waterbury, Conn.
Mrs. C. O. Harris, Dallas, Tex.
Mrs. Geo. Cutter and the Misses Gass, Chicago.
Mrs. Geo. T. Manson, New York.
Mrs. G. L. Austin, Boston.
Mrs. S. E. Barton, Boston.
Miss Myrtis Barton, Boston.
Mrs. C. H. Barney, New York.
Mrs. C. O. Baker, Jr., Newark, N. J.
Mrs. W. L. Candee, New York.
Mrs. F. E. Pettingell and child, Boston.
Mrs. Wm. M. Castle, Boston.
Mrs. E. H. Johnson, New York.
Mrs. W. J. Johnston, New York.
Mrs. E. W. Little, New York.
Miss Belle Ridlon, Boston.
Mrs. John A. Seely, New York.
Mrs. Fred Whipple, Detroit, Mich.
Mrs. John Young, Chicago.
Mrs. A. F. Mason, Boston.
Mrs. W. C. McIntire, Philadelphia.
Mrs. G. B. Prescott, Jr., New York.
Mrs. W. R. Kimball, Ft. Wayne, Ind.
Mrs. M. J. Francisco, Rutland, Vt.
Mrs. E. R. Weeks and child, Kansas City, Mo.
Mrs. C. R. Faben, Toledo, O.
Mrs. Geo. H. Wood, Providence, R. I.
Mrs. A. J. DeCamp, Philadelphia, Pa.
Mrs. M. M. Slattery, Ft. Wayne, Ind.
Mrs. Jas. F. Kelly and child, New York.
Mrs. P. H. Alexander, New York.
Mrs. Schuyler S. Wheeler, New York.
Mrs. J. P. Barrett, Chicago, Ill.
Mrs. W. A. Stadelman, Philadelphia, Pa.
Mrs. J. M. Orford, Bridgeport, Conn.
Mrs. C. D. Warner, New Haven, Conn.
Mrs. Chas. A. Bragg, Philadelphia, Pa.
Mrs. R. E. Gallagher, New York.
Mrs. G. W. Hart, Kansas City, Mo.
Miss E. W. Armstrong, Camden, N. J.
Miss Katharine Mitchell, Louisville, Ky.
Miss Moran, New York.
Miss M. B. Ford, Salem, N. J.
Mrs. J. J. Burleigh and two daughters, Camden, N. J.
Mrs. Harris, Dallas, Texas.
Mrs. J. P. McQuaide, New York.
Mrs. Jesse M. Smith, Detroit, Mich.

CONVENTION NOTES.

Ex-Presidents Duncan and Weeks were present, but ex-President Morrison did not attend.

Messrs. H. L. Lufkin and Hall represented the well known "C. & C." Motor Company of New York.

Mr. P. C. Ackerman represented the popular American Electrical Works in his ever pleasant manner.

The Executive Committee had its headquarters in room 28 and was evidently a very busy committee, as it was in session a great deal of the time.

Mr. Cyrus O. Baker, Jr., the platinum importer and refiner of Newark, N. J., was present, and as welcome as the flowers that bloom in the spring.

Mr. H. Ward Leonard, Mr. W. H. Fleming and Mr. W. J. Jenks were the representatives of the parent Edison Company in attendance on the Convention.

The Consolidated Fruit Jar Company, of 47 Warren street, New York, which deals in metal novelties, had its headquarters in one of the parlors on the second floor.

There was a larger attendance of gentlemen with their wives at this Convention than ever before. The attraction of the Cape May beach, no doubt, brought this about.

Mr. W. B. Cleveland, Cleveland, Ohio, had his new arc lamp hanger (which was illustrated in the ELECTRICAL REVIEW last week) on exhibition, and was present in person.

H. H. Eustis, President of the Eastern Electric Cable Company, of Boston, was present as the representative of his well-known insulating wire and cable manufacturing company.

The New York Insulated Wire Company had its headquarters at room 47, where a number of samples were exhibited. Messrs. R. E. Gallaher and J. W. Godfrey represented the company.

The Von Gestel dry battery, owned by the Crosby Electric Company, of New York, was exhibited by the inventor. Its appearance and the efficiency of the test shown attracted much attention.

Messrs. Queen & Company, the well known instrument dealers of Philadelphia, had their headquarters in room 45, where the latest information concerning galvanometers and resistance boxes, etc., was obtained.

Mr. George B. Prescott, Jr., attended his first Convention as representative of the Kerite Company, and made many new friends for this long-established and well known company.

The widely known Eddy Motor Company, of Windsor, Conn., was represented by the General Manager, Mr. Arthur D. Newton, and Mr. M. E. Baird, of Windsor, and Mr. W. C. McIntire, of Philadelphia and New York.

Mr. R. L. Shainwald, President of the Standard Paint Campany, of New York, manufacturer of the P. & B. compounds and conduits, with Mr. W. W. Castle, were present as the representatives of their companies.

The Connecticut Motor Company, of Bristol, Conn., had one of its new small motors on exhibition, and it attracted much attention from the practical men present. Secretary Stagg of the company was in attendance.

Mr. Wm. Bracken, President of the Consolidated Electric Storage Company, attended the Convention. His company exhibited some of its new storage batteries, which were constantly examined by the electrical visitors.

The Ansonia Brass and Copper Company was represented by Gilbert M. Smith, the company's Chicago manager. The neat little postage stamp holders presented by Mr. Smith seemed to fill a long-felt want, as everybody wanted one.

The National Carbon Company, of Cleveland, O., through Mr. Benj. F. Miles, again distributed to the visitors a very complete directory of electric lighting companies. This directory was sought for eagerly, and is really one of the best published.

Secretary Foote's office, rooms 4 and 6, was a busy scene during the Convention. Mr. Foote is to be congratulated upon the prompt and complete manner in which he did the work which makes that office so important on the occasion of Conventions.

The Perrett Motor, manufactured by the Elektron Company, of Brooklyn, N. Y., was brought to the notice of the attendants by the distribution of a number of circulars, showing the favor with which the motor had been received wherever installed.

A. L. Daniels had a very interesting exhibition of the commutator segments, wires, brushes, etc., manufactured by the Eureka Tempered Copper Company, of North East, Pa., in one of the corridors of the hotel, directly opposite the headquarters of the ELECTRICAL REVIEW.

Mr. J. P. McQuaide and Mr. W. A. Stadelman bravely rescued a young lady and gentleman who had ventured out too far in the water. The task of getting the exhausted ones ashore was no slight one, even for these two strong swimmers, as the waves were rolling very high.

Mr. H. L. Shippey, Secretary of the John A. Roebling's Sons Co., was present with Mr. F. A. V. Perrine, the manager of the electrical department of this great wire manufacturing house. Mr. Shippy is widely known in electrical circles, and made many new friends among the electric light men.

Although it was not expected that there would be many exhibits at this Convention, a number of interesting ones did appear and added greatly to the value of the gathering. The fact that there was no electric current in the hotel, and no incandescent lighting in the city, compelled all exhibits to be stationary.

The Bryant Switch Company was represented by Messrs. W. C. Bryant, John C. English, of New Haven, and J. M. Orford, Bridgeport. The new electrical work of this company is attracting the attention of electrical men in general, and they are now completely organized with ample manufacturing facilities.

Miss Agnes R. Keane, of Pittsburgh, artistically rendered a couple of solos for the benefit of the electric light people, in the ballroom of the Stockton, Wednesday evening. Miss Keane is a young and beautiful singer, possessing a very fine voice, and is just entering on what promises to be a most successful career.

Charles E. Gregory, of the Sperry Electric Company, of Chicago, gave a practical illustration of the new triple carbon of his company, immediately in front of the Stockton Hotel. This new lamp promises to be an important factor in electric lighting, since arc lamp litigation has assumed its present proportions.

Mr. H. L. Storke, who has heretofore been known as the "Pooh-bah" in the telephone business, appeared on the scene this time as a full-fledged electric light man. Mr. Storke is the president of the Yonkers Electric Light Company, operating the Thomson-Houston system. He will now have to add another to his numerous electrical titles.

The Crocker-Wheeler Company had the most extensive motor exhibit, and both Messrs. Crocker and Wheeler were present; their headquarters in the main corridor were prominently located, and were constantly visited. The secretary and treasurer of the company, Mr. T. McCoubray (former secretary of the Association), was also present, and was greeted by many old-time friends.

Messrs. Chadbourne, Hazelton & Company, of Philadelphia, were represented by Mr. W. A. Stadelman and Mr. William Hazelton, 3d. They had a very interesting exhibit in the main corridor of the Stockton Hotel. The exhibit consisted of one 30 horse-power Wenstrom dynamo, street car gears and a model of the new electric elevator which is being introduced by this company.

Mr. George S. Bowen, formerly of Chicago, but at present of New York city, who called the first Convention of electric light men to order in Chicago in February, 1885, and acted as its temporary presiding officer, was present at the Cape May Convention, the first time in several years. He was warmly welcomed by his old friends of the electrical fraternity, and, as appears in our account of the proceedings, was called to the platform, and delivered a few interesting remarks.

Mr. Louis D. Beck, the president of the Norwich Insulated Wire Company, attended his first Electric Light Convention and was promptly initiated into the front rank of electrical men. Parlor 5, where he made his headquarters, was one of the most popular places for electrical men to congregate during the Convention. Mr. Beck made many friends among the electrical people, and will be a regular attendant at their various Conventions hereafter. Mr. J. A. Wetmore, of the Norwich Company, assisted Mr. Beck.

A number of the regular guests at the Stockton attended the meetings, and many of both sexes became acquainted with the lively electrical visitors. The number of unmarried men engaged in electrical work was particularly noticeable at Cape May, where so many attractive and fascinating ladies were in need of ballroom partners and bathing escorts. Several of the gallant gentlemen are to be praised for rescuing fair and exhausted bathers, and one lady, brave and beautiful, won the unique distinction of turning the tables and saving the life of her would-be protector.

The electrical novelties promised by the Sawyer-Man Electric Company proved to be as attractive and interesting as expected. In addition to a large number of incandescent lamp fittings, a new insulating compound known as "Alexite" was shown. This can be made in any shape and colored to fit any wood, marble or wall paper, and is said to be less expensive than other insulation of similar quality. The samples which were shown in various designs were very beautiful and attracted much favorable comment. Mr. P. H. Alexander, Gen. C. H. Barney and Mr. Morris represented the Sawyer-Man Company.

The most interesting exhibit made was in one of the large parlors adjoining the dining room. Here the Interior Conduit and Insulation Company had an exhibition in a very artistically arranged cabinet, showing the complete working process of the interior conduit. The cabinet was a very large one, and elegantly gotten up, and at one glance the visitors could see the complete system. In addition were some sections of the underground conduit manufactured by the same company. The company was represented by the President, Mr. Edward H. Johnson, and the inventor of the system, Mr. E. T. Greenfield.

(*Continued on Page 15.*)

A Proper Basis for Determining Electric Motor Rates.

BY H. L. LUFKIN, BEFORE THE ELECTRIC LIGHT ASSOCIATION, CAPE MAY, AUGUST 19–21, 1890.

The equitable adjustment of motor rates, or rather the rates per month or year for the supply of current for the operation of electric motors, has long been a matter of considerable annoyance to companies supplying electric power. It is obvious that to invariably charge the motor user an arbitrary rate per horse-power for the motor which he uses, based on its rated capacity, and regardless of the work it is doing, is not satisfactory, for the reason that the manufacturer usually prefers to buy a motor somewhat more powerful than his work really requires, and thus avoid the possible damage to his motor from overload or the strain to which any piece of machinery is subjected when constantly operated above its normal working capacity. Again, the manufacturer may contemplate an increase in his plant in the near future, and, in buying a motor, will provide one of sufficient capacity to operate his prospective increase.

To illustrate graphically the practical operations of motors under load I have taken a large number of records of motors in actual service, and from these records have laid out ampere curves or daily load diagrams which will illustrate very clearly the fluctuations in the current supplied to motors in actual practice. Other interesting features of these curves are the maximum, minimum and average readings as related to each other; the current consumed in driving the shafting as related to the average current consumed; and the peculiarity of the records of motors operating elevators.

Copies of these load records are illustrated in the accompanying diagrams. The vertical lines of these charts, you will notice, represent hours of the day, and the horizontal lines, amperes. In making these records an amperemeter was placed in the circuit in series with the motor, and each reading taken was dotted on the chart where the ampere line, corresponding with the reading taken, intersected the hour line corresponding with the time at which the reading was taken. By connecting these dots together with a continuous line, we, of course, obtain the diagrams or curves shown.

The highest average use shown in any of these records is in diagram No. 2, with an average use of 81 per cent. of the capacity of the motor; this record also shows an overload of 44 per cent. at the 2 P. M. reading. Diagram No. 16 shows the lowest average, it being in this case but 24 per cent. of the capacity of the motor. A composite average of all these records shows that the average use of an electric motor is but 43.57 per cent. of its rated capacity.

It is a fact that many central stations which still use a "maximum or motor capacity system" of charges, have adopted a schedule with the fact in view that where the motor is used for the usual run of intermittent work, its average use is much below its capacity. The circumstances of motor use are, however, so varied, that a system of rates or charges for power, which shall better adapt itself to this wide range of conditions, has already been adopted by many central stations, especially those operating constant potential power circuits. This system of charges I will call the "maximum reading system," which is based on the maximum reading of an amperemeter in series with the motor. The station supplying the power reserves the right in their contract with the customer to change or modify the charge for power from time to time, as any increase is shown by these readings.

To illustrate more clearly this "maximum reading system," I would refer to diagram No. 23, which is a fair average record. This represents the record of a 15 horse-power motor operating lithograph presses, etc., the maximum reading in this case being 75 amperes, or, approximately, 10 horse-power. The user is given a 10 horse-power rate, which in this case happens to be $60 per month, or a rate of $6 per month per horse-power based on maximum readings. As the average power delivered to this user is but 67 per cent. of the maximum reading, the station actually receives at this nominal rate of $6 per horse-power an actual rate of $9 per month per horse-power for the power actually delivered.

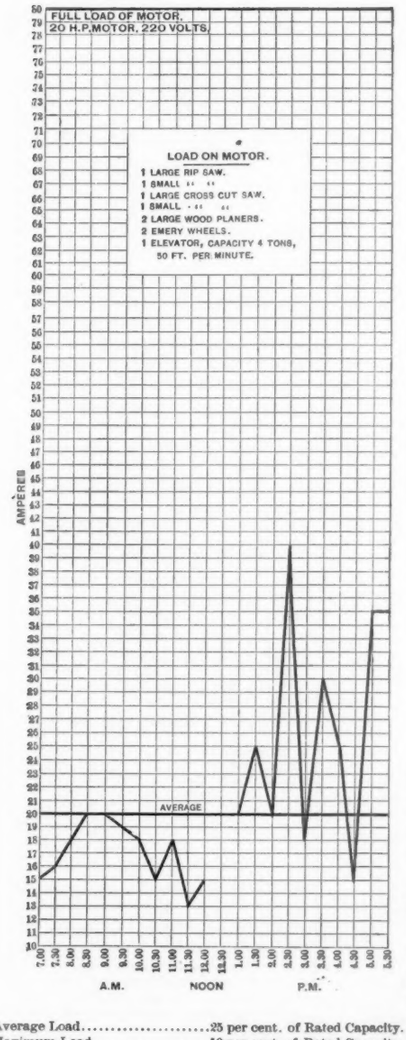
The central station supplying this particular motor has adopted the "maximum reading system," and this rate of $6 per month per horse-power is their standard charge for motors showing a reading of five horse-power and over up to 15 horse-power. From 15 horse-power up their charge is $5 per month per horse-power. Their monthly bills are also subject to a discount of 5 per cent., I believe, if paid promptly on the first of each month.

To return again to the diagrams. The records, 29 in number, are of so varied a character that an average taken from all the records will, I think, show within one per cent. or two per cent. of the general average conditions found in electric motor practice. The conditions as shown by these records are as follows:

Average load on motor, 43.57 per cent. of its capacity.

Maximum load on motor, 68.24 per cent. of its capacity.

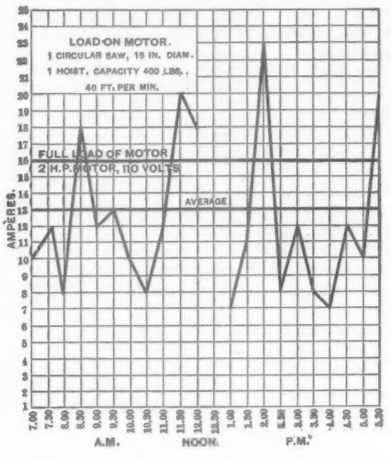
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....25 per cent. of Rated Capacity.
Maximum Load.....50 per cent. of Rated Capacity.
Average Load.....50 per cent. of Maximum Load.
Shafting.....75 per cent. of Average Load.

No. 1.

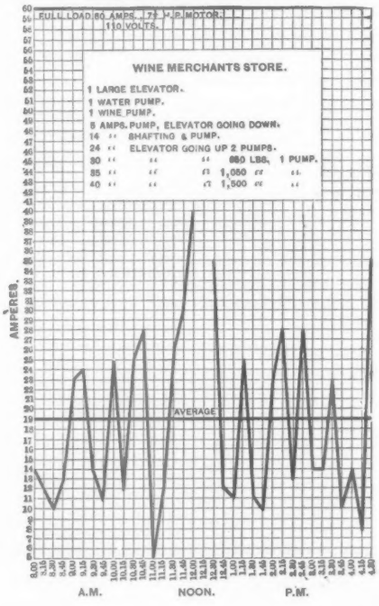
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....81 per cent. of Rated Capacity.
Maximum Load.....44 per cent. in excess of Rated Capacity.
Average Load.....51 per cent. of Maximum Load.
Shafting.....55 per cent. of Average Load.

No. 2.

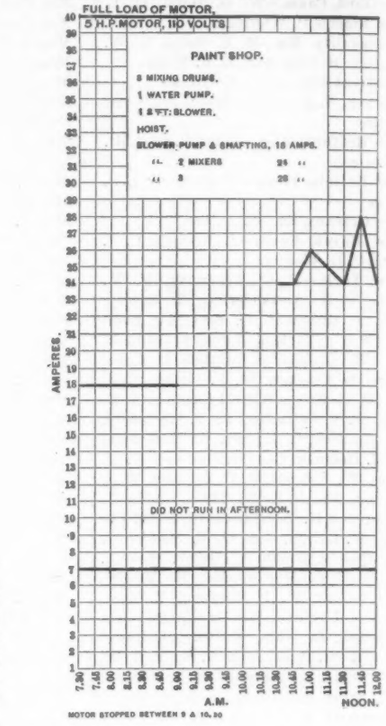
H. L. Lufkin.—C. & C. Electric Motor Co.


FULL LOAD 80 AMPS. 7½ H.P. MOTOR, 110 VOLTS.
WINE MERCHANTS STORE.
1 LARGE ELEVATOR.
1 WATER PUMP.
1 WINE PUMP.
8 AMPS. PUMP, ELEVATOR GOING DOWN.
16 " SHAFTING & PUMP.
24 " ELEVATOR GOING UP 2 PUMPS.
30 " " " 650 LBS. 1 PUMP.
35 " " " 1,050 " "
40 " " " 1,500 " "
AVERAGE
AMPERES.
A.M.
NOON.
P.M.

Average Load.....32 per cent. of Rated Capacity.
Maximum Load.....67 per cent. of Rated Capacity.
Average Load.....47½ per cent. of Maximum Load.

No. 3.

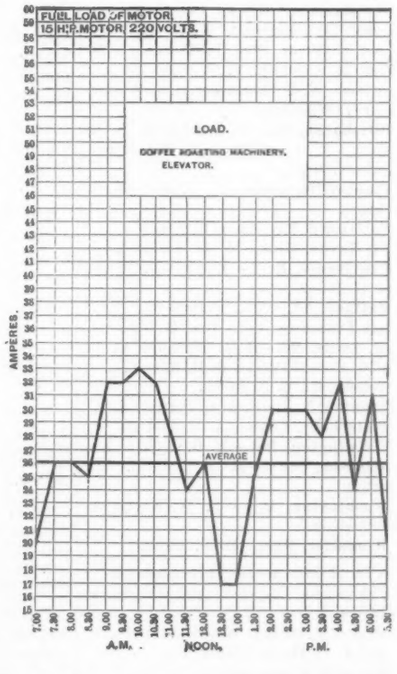
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....17½ per cent. of Rated Capacity.
Maximum Load.....70 per cent. of Rated Capacity.
Average Load.....25 per cent. of Maximum Load.
Shafting.....— per cent. of Average Load.

No. 4.

H. L. Lufkin.—C. & C. Electric Motor Co.



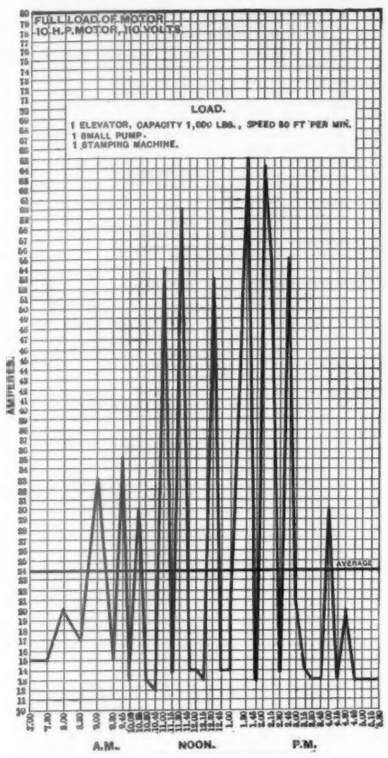
Average Load.....43¼ per cent. of Rated Capacity.
Maximum Load.....55 per cent. of Rated Capacity.
Average Load.....78 per cent. of Maximum Load.
Shafting.....65 per cent. of Average Load.

No. 5.

Average load on motor, 64 per cent. of maximum load.

Reducing these averages to dollars and cents we have the following results:

H. L. Lufkin.—C. & C. Electric Motor Co.

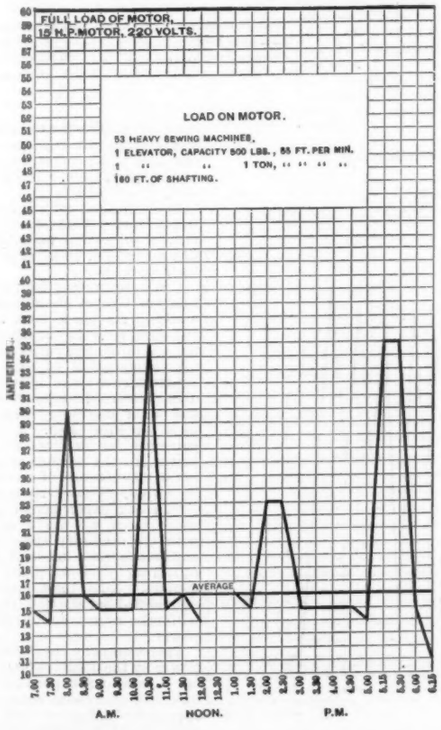


Average Load.....30 per cent. of Rated Capacity.
Maximum Load.....81 per cent. of Rated Capacity.
Average Load.....37 per cent. of Maximum Load.

No. 6.

Thirteen dollars and 80 cents per month per horse-power is certainly a tempting price for power, but it is open to some serious objections. In the first place, at this price the electric motor, even with its much higher efficiency, cannot compete with the gas engine. A good gas engine uses about

H. L. Lufkin.—C. & C. Electric Motor Co.



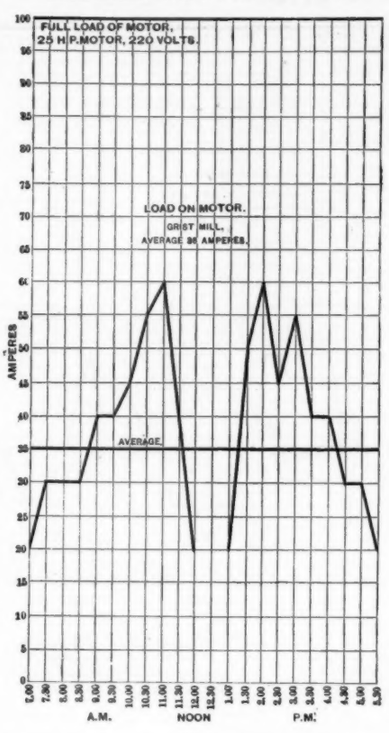
Average Load.....36 per cent. of Rated Capacity.
Maximum Load.....58 per cent. of Rated Capacity.
Average Load.....46 per cent. of Maximum Load.
Shafting.....71 per cent. of Average Load.

No. 7.

power actually delivered. A "maximum reading" rate of $6 per month per horse-power pays the station $9.37 per month per horse-power for the power actually delivered.

20 feet of gas per hour per horse-power, or about 5,200 cubic feet per month. Giving gas at $1.50 per 1,000 (and in many places it is much lower than this), the gas engine will deliver power at a cost of $7.80 per month per horse-power. We can, without much trouble, obtain the $9.37 rate per month for a motor in competition with the gas engine, on account of its many and obvious advantages, but we can seldom obtain the $13.80 rate. This maximum capacity rate also very much hampers the user in a

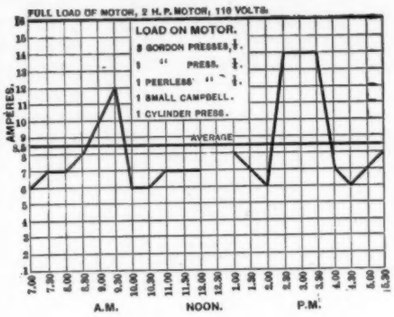
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....35 per cent. of Rated Capacity.
Maximum Load.....60 per cent. of Rated Capacity.
Average Load.....58 per cent. of Maximum Load.
Shafting.....58 per cent. of Average Load.

No. 8.

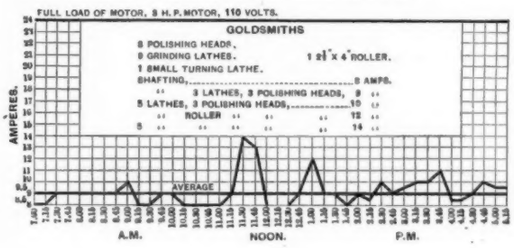
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....53 per cent. of Rated Capacity.
Maximum Load.....88 per cent. of Rated Capacity.
Average Load.....60 per cent. of Maximum Load.
Shafting.....70 per cent. of Average Load.

No. 25.

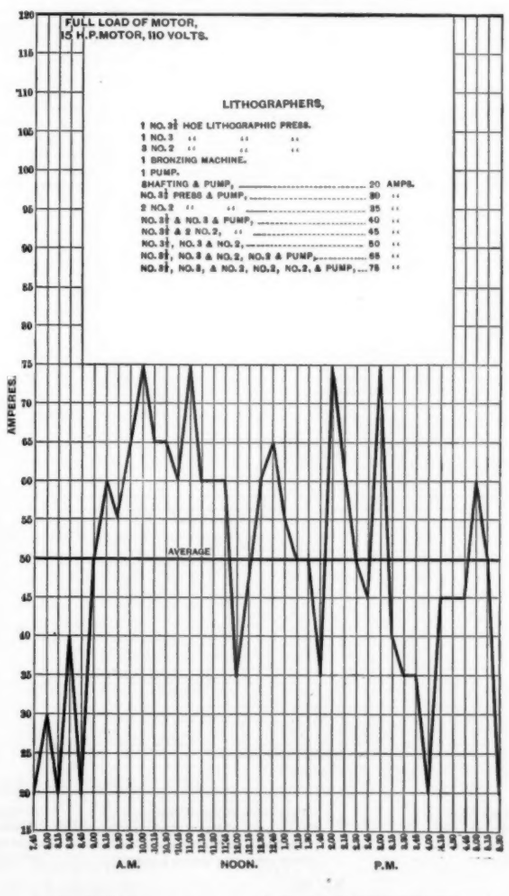
H. L. Lufkin.—C. & C. Electric Motor Co.


FULL LOAD OF MOTOR, 8 H.P. MOTOR, 110 VOLTS.
GOLDSMITHS
8 POLISHING HEADS,
9 GRINDING LATHES. 1 21" x 4" ROLLER.
1 SMALL TURNING LATHE.
SHAFTING,.....8 AMPS.
" 3 LATHES, 3 POLISHING HEADS, 9 "
5 LATHES, 3 POLISHING HEADS,.....10 "
" ROLLER " " " 12 "
5 " " " " " 14 "
AMPERES.
AVERAGE.
A.M.
NOON.
P.M.

Average Load.....37½ per cent. of Rated Capacity.
Maximum Load.....59 per cent. of Rated Capacity.
Average Load.....64 per cent. of Maximum Load.
Shafting.....89 per cent. of Average Load.

No. 13.

H. L. Lufkin.—C. & C. Electric Motor Co.


FULL LOAD OF MOTOR,
15 H.P. MOTOR, 110 VOLTS.
LITHOGRAPHERS,
1 NO. 2½ HOE LITHOGRAPHIC PRESS.
1 NO. 3 " " "
3 NO. 2 " " "
1 BRONZING MACHINE.
1 PUMP.
SHAFTING & PUMP,.....20 AMPS.
NO. 2½ PRESS & PUMP,.....30 "
2 NO. 2 " " .....35 "
NO. 2½ & NO. 3 & PUMP,.....40 "
NO. 2½ & 2 NO. 2, " .....45 "
NO. 2½, NO. 3 & NO. 2,.....50 "
NO. 2½, NO. 3 & NO. 2, NO. 2 & PUMP,.....65 "
NO. 2½, NO. 3, & NO. 2, NO. 2, NO. 2, & PUMP,....75 "
AMPERES.
AVERAGE.
A.M.
NOON.
P.M.

Average Load.....42 per cent. of Rated Capacity.
Maximum Load.....62½ per cent. of Rated Capacity.
Average Load.....67 per cent. of Maximum Load.
Shafting.....40 per cent. of Average Load.

No. 23.

selection of a motor, and the motor salesman, in order surely to effect a sale, is very apt to underrate the prospective load on the motor, as the customer is governed in his purchase of a machine much more by the monthly charge than by the first cost of the motor.

Another feature which must not be lost sight of is the fact that a motor user who has bought and paid for his machine becomes your permanent customer, his income being entirely derived from the product of the work of his motor. His bills for power you are also sure of collecting, for the moment his power is shut off his earning capacity ceases. The motor becomes to him an absolute necessity instead of a seasonable luxury, as is the case with many electric lights.

Another very remarkable feature brought out by these diagrams is the fact that the average power consumed in doing serviceable work is but three-eighths of the total power used, and the remaining five-eighths (68 per cent.) is consumed in driving shafting. This enormous loss in shafting would indicate that the day may be not far distant when each machine will be equipped with its own direct-geared motor, and that the days of shafting and belting are numbered.

As a concluding reference to these diagrams, let me call your attention to diagram No. 3, in which a condition presents itself with which you are familiar in theory, but which has, I believe, never before been practically illustrated, namely, the counter E. M. F. in the armature of a shunt wound motor driving a spur gear elevator. When the elevator is coming down with a load the counter E. M. F. runs above the E. M. F. of the supplying circuit, and therefore the motor becomes a producer instead of a consumer, and thus acts as a break to retard the too rapid descent of the elevator.

Diagram No. 3 represents the record of a seven and one-half horse-power motor in a wine merchant's store operating an elevator, a small piston water pump and wine pump. The water pump is in continuous operation, the wine pump and elevator being only used intermittently. The current consumed in the shafting and water pump, which constitute the continuous load, is 14 amperes. The difference between this 14 amperes and the several readings below that amount, shows the amount of current generated by the motor when the elevator is coming down. As this class of elevator is largely used, this peculiar fact becomes an item of considerable importance to the central station, and is also a strong argument in favor of a constant potential power circuit, as only on this circuit can these conditions be obtained.

I had hoped to prepare some diagrams of motors on series or arc light circuits for comparison with the records here submitted, and thereby illustrate graphically the advantages of the constant potential circuit for power distribution. Want of time has, however, prevented this.

In conclusion, let me read you some extracts from a letter received in March last from a prominent manufacturing corporation using 75 or 80 horse-power in motors in their work shops.

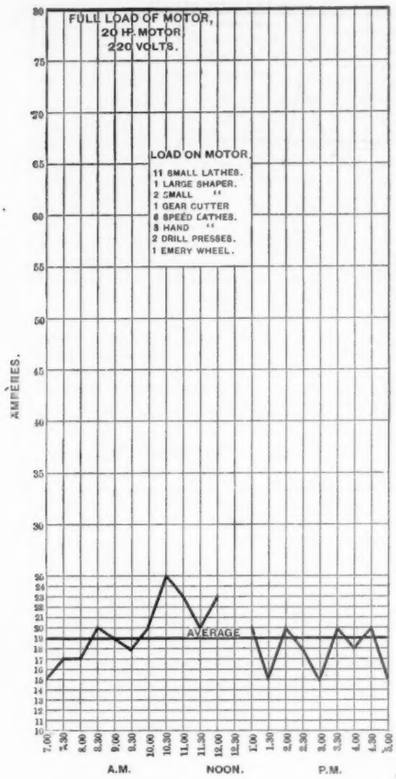
"We are running with one motor a large four-ton Graves' elevator and several woodworking machines, such as planers, crosscut saws, etc. In our machine department the several motors run several lines of shafting, independent of each other. In this department we run heavy planers, lathes, drill presses, shapers, slotters, gear-cutters and other machinery necessary to a complete machine shop. A motor in our department for fine wood work furnishes power for the various machines necessary to the manufacture of articles needing turning lathes, gig-saws, rip-saws, etc.

"In our experimental department and show room we use a smaller motor, set with the necessary speed-reducing pulleys and belts upon a movable frame. This we roll from place to place as convenience dictates. All of these motors are giving us unqualified satisfaction, and we would not willingly return to direct steam engine power."

This company is being supplied with power by the local electric light company, on a basis of $50 per year per horse-power based on maximum readings. The user is apparently delighted with his service and perfectly satisfied with the cost of his power, and I have the assurance of the electric light company supplying the power, that they would be glad to load their plant under the same terms given this customer.

* * The first electric freight railroad is projected at Fall River, Mass. It will be a belt line reaching the principal mills. The scheme is said to be backed by the Thomson-Houston Company.

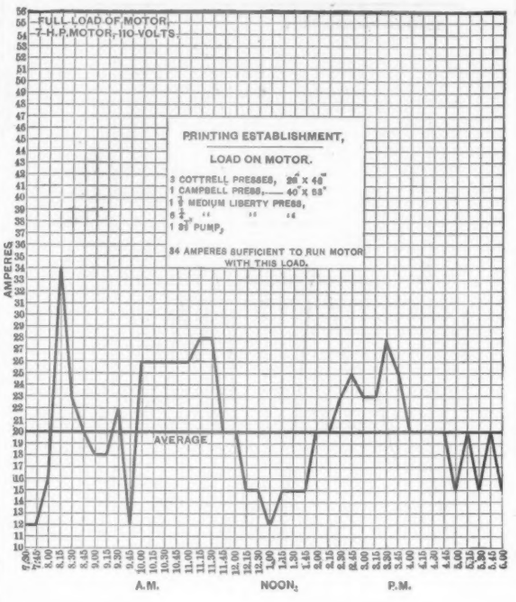
H. L. Lufkin.—C. & C. Electric Motor



Average Load.....24 per cent. of Rated Capacity.
Maximum Load.....31 per cent. of Rated Capacity.
Average Load.....76 per cent. of Maximum Load.
Shafting.....79 per cent. of Average Load.

No. 16.

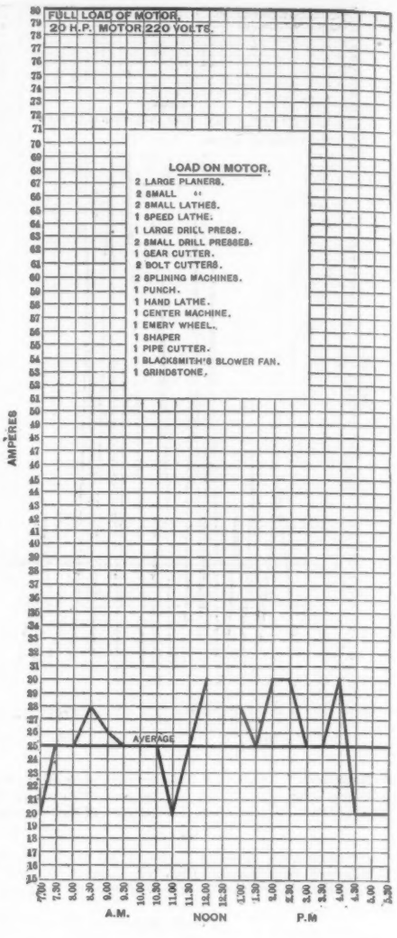
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....36 per cent. of Rated Capacity.
Maximum Load.....61 per cent. of Rated Capacity.
Average Load.....58½ per cent. of Maximum Load.
Shafting.....60 per cent. of Average Load.

No. 27.

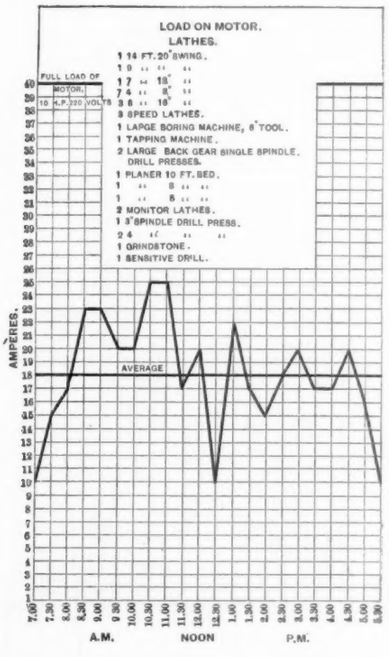
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....32½ per cent. of Rated Capacity.
Maximum Load.....37½ per cent. of Rated Capacity.
Average Load.....83 per cent. of Maximum Load.
Shafting.....80 per cent. of Average Load.

No. 17.

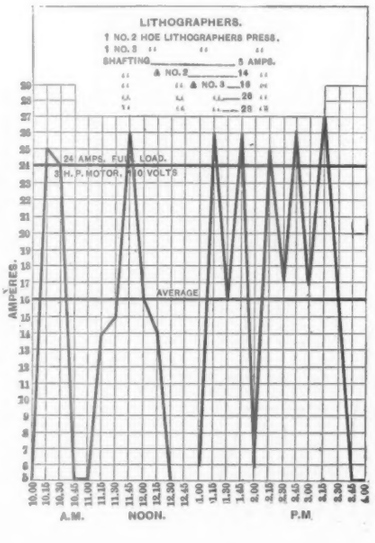
H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....45 per cent. of Rated Capacity.
Maximum Load.....62½ per cent. of Rated Capacity.
Average Load.....72 per cent. of Maximum Load.
Shafting.....56 per cent. of Average Load.

No. 20.

H. L. Lufkin.—C. & C. Electric Motor Co.



Average Load.....67 per cent. of Rated Capacity.
Maximum Overload.....12½ per cent. of Rated Capacity.
Average Load.....59 per cent. of Maximum Load.
Shafting.....39 per cent. of Average Load.

No. 22.

CONVENTION NOTES.

(Continued from page 11.)

Senator Fred Royce gets wittier as he gets grayer.

Mr. Chas. McLean Paine, of New York, a highly accomplished vocalist, very kindly sang twice, and greatly entertained the listeners.

Capt. T. H. Brady, the well known inventor of the Brady mast arm, of New Britain, Conn., was welcomed by many friends, who were glad to see him out again, and recovered from his long and severe illness.

Mr. P. H. Alexander, in a white yachting cap, looked lovely. Some of the boys asked to see the yacht, and suggested that he take them to see a schooner come over the bar. Then the mariner would pull a mystic card from his pocket which silenced them.

H. M. Smith represented the Washburn & Moen Mfg. Company, and presented each electrical visitor with a very valuable little hand book filled with important and carefully compiled data. He also exhibited handsome samples of the wire manufactured by his company.

The Empire City Electric Company, New York, had an exhibit in Parlor C of the new Helmet wire. A number of cards of samples and several coils of wire were comprised in the exhibit. The company was represented by its President, Gen. O. E. Madden, and Mr. C. J. Hague.

Messrs. Royce & Marean, of Washington, D. C., the electrical dealers and electrical manufacturers, were represented by the senior member of the firm, Mr. Fred W. Royce; his appreciation of the bathing facilities at Cape May were so great that three baths a day were his average.

A number of the members of the Association came down on Tuesday and Wednesday, and some came even as late as Thursday. The meetings of the Convention were not very largely attended, although there were from 150 to 200 electrical persons at the Stockton Hotel Convention week.

Treasurer Burbank and General Agent H. S. Conant, of the Evans Friction Cone Company, of Boston, were in attendance and found quite an interest taken in their method of furnishing power. They had with them a number of catalogues illustrating the recent installations of their system.

Henry D. Stanley, without whom an Electric Light Convention would seem lost, and who has only missed one Convention since the Association was formed—that at Niagara Falls, where, no doubt owing to his absence, there came very near being a split in the Association—was present on this occasion and represented in his usual royal way the Bridgeport Brass Company.

The Seely & Taylor Manufacturing Company, of New York, presented a number of their novelties, among these being the "new Seely insulated flexible moulding." This cleat is something new in electric lighting circles, and is composed of two conductors imbedded in insulating material, which is moulded in the form of a moulding, and can be run without danger of fire or crossing of wires in the most difficult places.

Gen. O. E. Madden, President of the Empire City Electric Company, of New York City, attended his first Electric Light Convention, and added to his great list of electrical friends many new ones in the electric lighting field. Gen. Madden exerted himself as peace maker in the clash which seemed about to occur at one time between central station men and associate members, and his efforts in this respect were crowned with the success which meets them always.

The Executive Committee appointed a Committee on Reception, composed of the representatives of each of the electrical papers. This committee had entire charge of the music, dancing, recitations, etc., which were given each evening, from 9 to 11 o'clock, in the ballroom of the Stockton Hotel. These entertainments were a delightful feature of the Cape May Convention, and with the perfect sea-bathing, which was indulged in each day at noon, made the Cape May Convention, in point of enjoyment, the most successful ever held.

One of the large parlors on the first floor was occupied by the Okonite Company, of New York, which was represented by Mr. W. L. Candee and Mr. George T. Manson, of New York, and F. E. Pettingell, of Boston. The walls of the parlor were decorated with views of the new factory of the company, and a large number of samples of the well known Okonite cable and wire and the Candee wire and Manson tape were exhibited. This company sent out to every one attending the Convention a very neatly gotten up circular note which, under the heading of "Facts," presented the claims of this well known and popular wire.

TENDERS

FOR

LIGHTING THE STREETS

OF THE

CITY OF TORONTO.

Tenders addressed to the undersigned will be received by registered post up to 12 o'clock noon of TUESDAY, SEPTEMBER 2d, 1890, for the lighting of the streets, avenues, squares and lanes of the city of Toronto with electric light, gas light, or both, for a period of two, three and five years from the 1st of January, 1891.

Specifications and forms of tender can be obtained upon application at the office of the secretary of the fire department, corner of Bay and Temperance streets, Toronto.

A cash deposit or marked check, made payable to the order of the city treasurer, for the sum of three thousand dollars ($3,000), must accompany each and every tender, together with the *bona fide* signatures of two responsible persons, who will become sureties for the due fulfillment of the contract. The deposit accompanying the tender will be forfeited to the city, in the event of the person or persons, whose tender is accepted, failing to execute the necessary contract, or give satisfactory sureties for the due fulfillment of the same. Deposits of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted. WILLIAM BELL,

Chairman Committee Fire and Light.

City clerk's office, Toronto, August 8, 1890.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON AUGUST 19, 1890.

434,159 Incandescent electric lamp; Albert L. Reinmann, Allegheny, assignor to the Westinghouse Electric Co., Pittsburgh, Pa.

434,162 System of electrical distribution; Oliver B. Shallenberger, Rochester, and Henry M. Byllesby, Pittsburgh, assignors to the Westinghouse Electric Co., Pittsburgh, Pa.

434,163 Protector for electric machines; Lewis B. Stillwell, Pittsburgh, Pa., assignor to the Westinghouse Electric Co., same place.

434,164 Core for electrical apparatus; Chas. A. Lewy, Pittsburgh, Pa., assignor to the Westinghouse Electric Co., same place.

434,165 Subway for electric conductors; George Westinghouse, Jr., Pittsburgh, Pa.

434,166 Electric arc interrupter. 434,167 434,170 434,371 Lightning arrester. 434,168 Safety fuse for electric circuits. 434,169 Electric safety fuse box; Alexander Wurtz, Pittsburgh, Pa., assignor to the Westinghouse Electric Co., same place.

434,175 Electric arc lamp; William E. Cady, Corry, Pa.

434,180 Electric motor. 434,181 Device for the adjustment and testing of electric cars; Theodore M. Foote, Boston, Mass.

434,199 Connector for secondary batteries; James K. Pumpelly, Chicago, Ill., assignor to D'Estaing S. Covert, same place.

434,206 Armature for dynamos; Albert Schmid, Allegheny, assignor to the Westinghouse Electric Co., Pittsburgh, Pa.

434,234 Secondary battery; Henry Woodward, Toronto, Canada.

434,261 Printing telegraph; Theodore M. Foote, Boston, Mass., assignor of one-half to Chas. J. Pillsbury, same place.

434,286 Combined easel and phonograph horn tripod; Kendall J. Minot, Galveston, Texas.

434,376 Secondary battery; Geo. W. Cochran, New York, N. Y., assignor of one-half to Benjamin Franklin, same place.

434,382 Electro-magnetic clutch; Stanley C. C. Currie, Philadelphia, Pa., assignor by mesne assignments to the United Gas Improvement Co., same place.

434,390 Electric railway; Rudolph M. Hunter, Philadelphia, Pa.

434,410 Closed conduit for electric conductors; Chas. J. Van Depoele, Lynn, Mass.

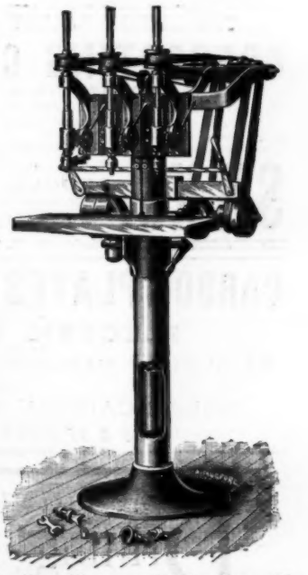
434,427 Thermo-electric battery. 434,428 Thermo-electric generator; Harry B. Cox, New Haven, Conn., assignor to the Electric Generator Co., Portland, Maine.

434,429 434,500 Thermo-electric generator; Harry B. Cox, Hartford, Conn.

434,430 Electric welding clamp; Hermann Lemp, Lynn, Mass., assignor to the Thomson Electric Welding Co., of Maine.

Sigourney Drills.

IMPROVED.



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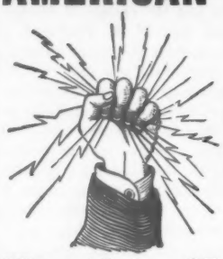

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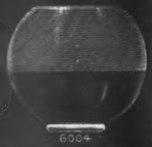
GLOBES  **SHADES**
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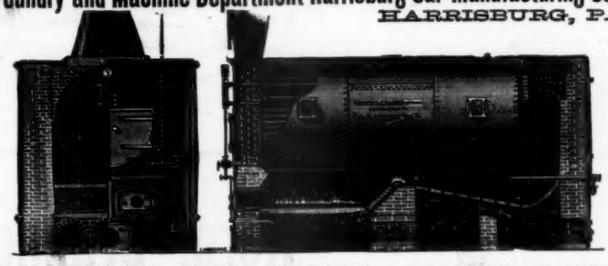

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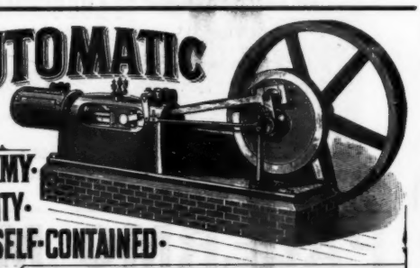

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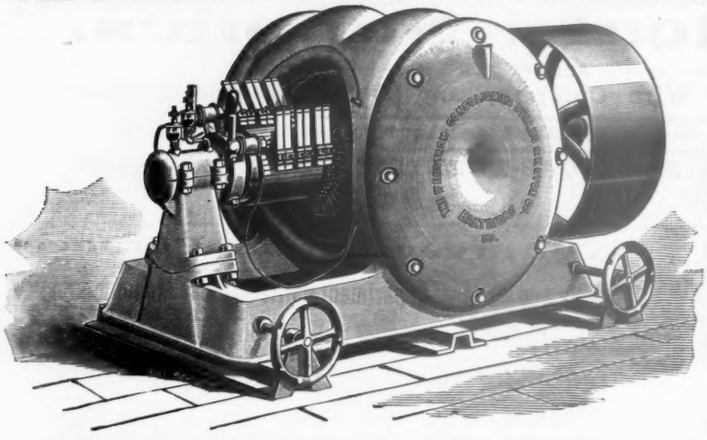

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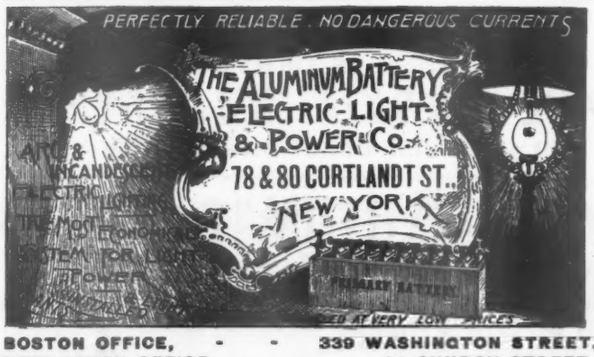

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C	8	.....	.....	.....	6.5	1¾	5,000 FEET PER MINUTE.	530
D	.....	10	.....	.....	6.3	1¾		530
E	.....	.....	.....	25	8.0	2		530
F	16	.....	.....	.....	12.0	2¼		780
G	.....	20	.....	.....	12.5	2½		780
H	.....	.....	26	.....	13.0	2½		780
I	20	.....	.....	.....	15.0	3		990
J	.....	25	.....	.....	15.6	3		990
K	.....	.....	32	.....	15.0	3		990
L	.....	.....	.....	50	16.0	3		990
M	28	.....	.....	.....	21.0	4½		1,360

Ball Electric Light Co., 404 WEST 27th STREET, NEW YORK

LIST OF DYNAMOS IN STOCK.

Designation of Machine.	No. Lights 2,000 c. p. 10 amp. X	No. Lights 1,600 c. p. 8 amp. Y	No. Lights 1,200 c. p. 6 amp. Z	No. Lights 800 c. p. 4 amp.	Horse-Power at Pulley of Dynamo.	Width of Single Belt in Inches.	Belt Speed Required.	Weight of Dynamo.
C	.....	35	.....	.....	21.0	4		1,360
D	.....	.....	45	.....	21.0	4		1,360
E	.....	.....	.....	70	21.0	4½		1,360
F	40	.....	.....	.....	29.7	6		1,750
G	.....	50	.....	.....	30.0	6		1,750
H	.....	.....	64	.....	29.5	6		1,750
I	52	.....	.....	.....	38.0	8		2,290
J	.....	65	.....	.....	38.6	8		2,290
K	.....	.....	83	.....	38.0	8		2,290
L	64	.....	.....	.....	46.5	10		2,770
M	.....	80	.....	.....	47.1	10		2,770
N	75	.....	.....	.....	52.5	12		3,300

5,000 FEET PER MINUTE.

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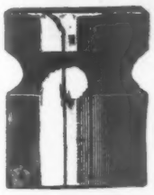

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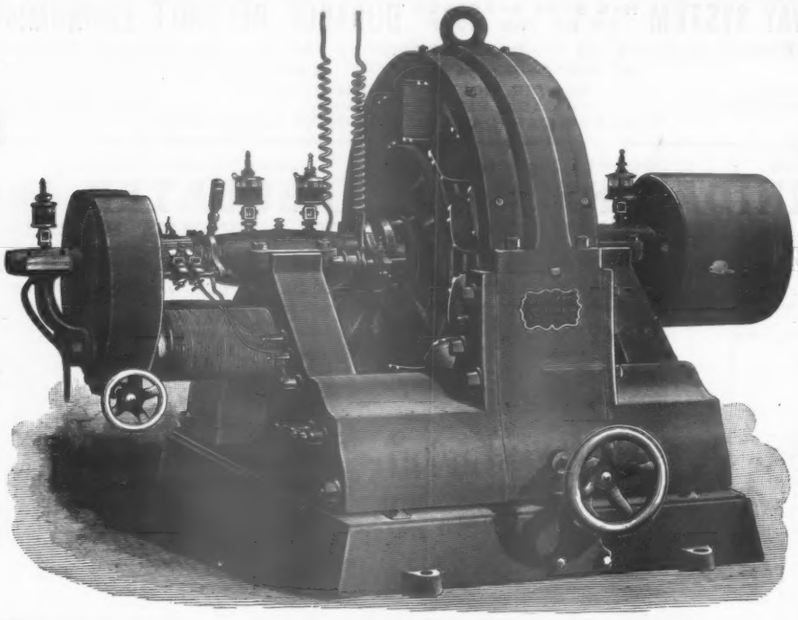

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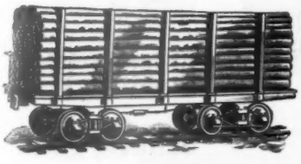

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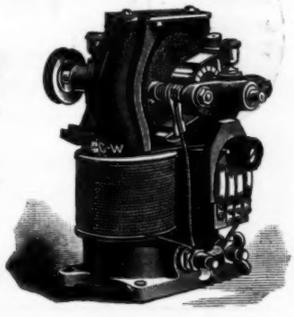

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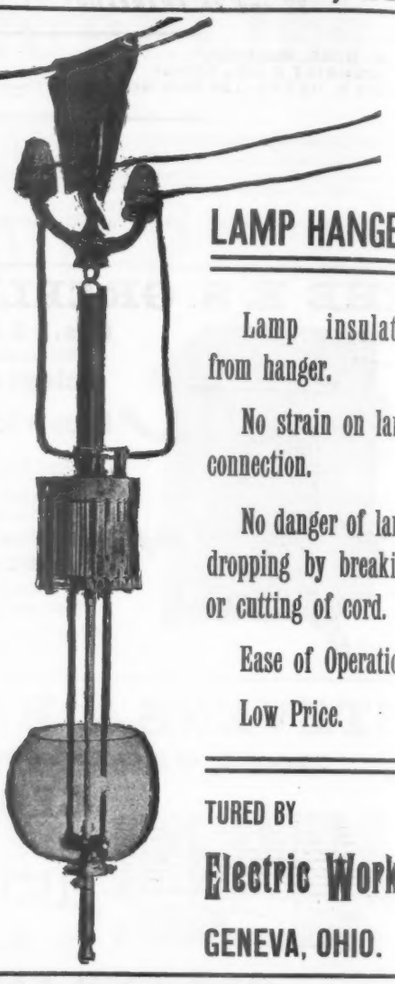

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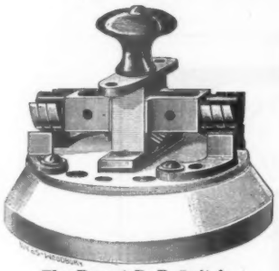

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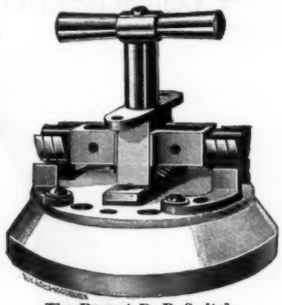

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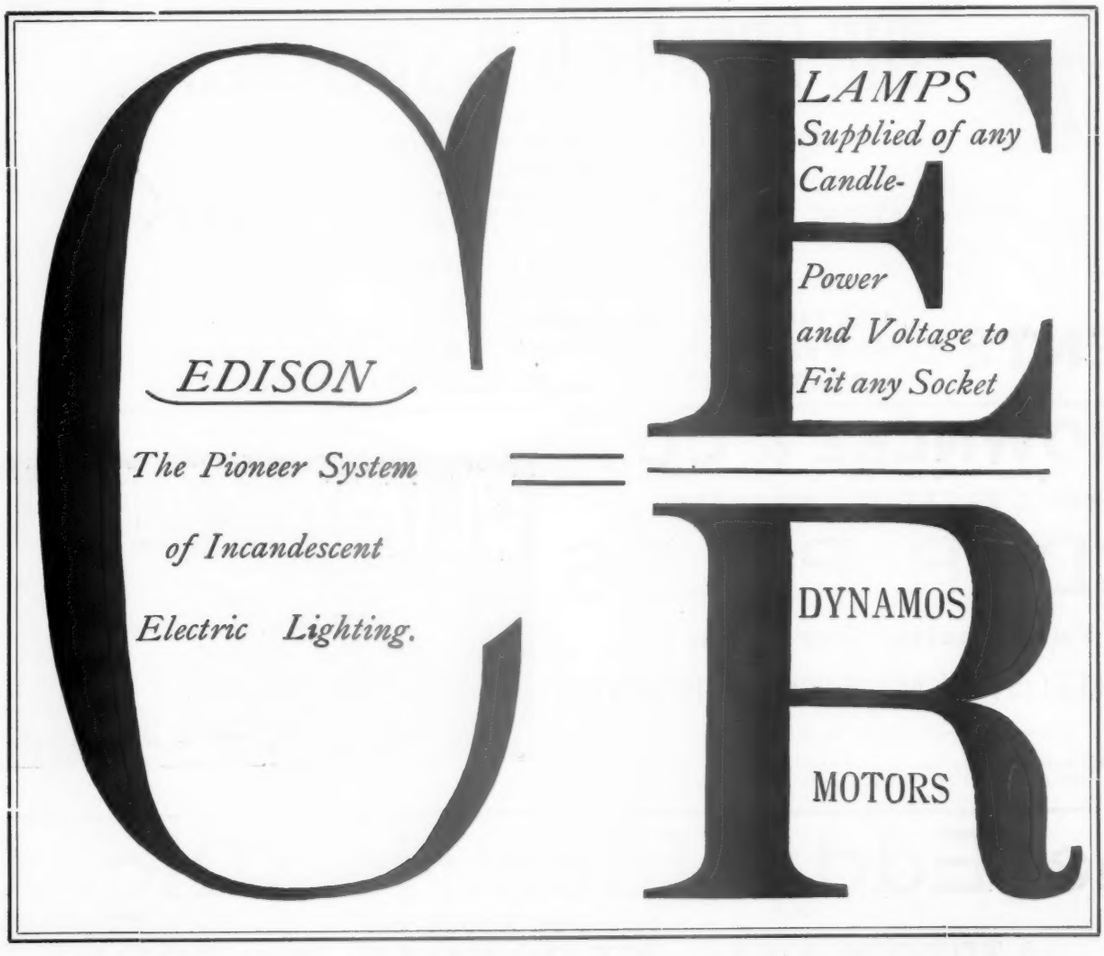

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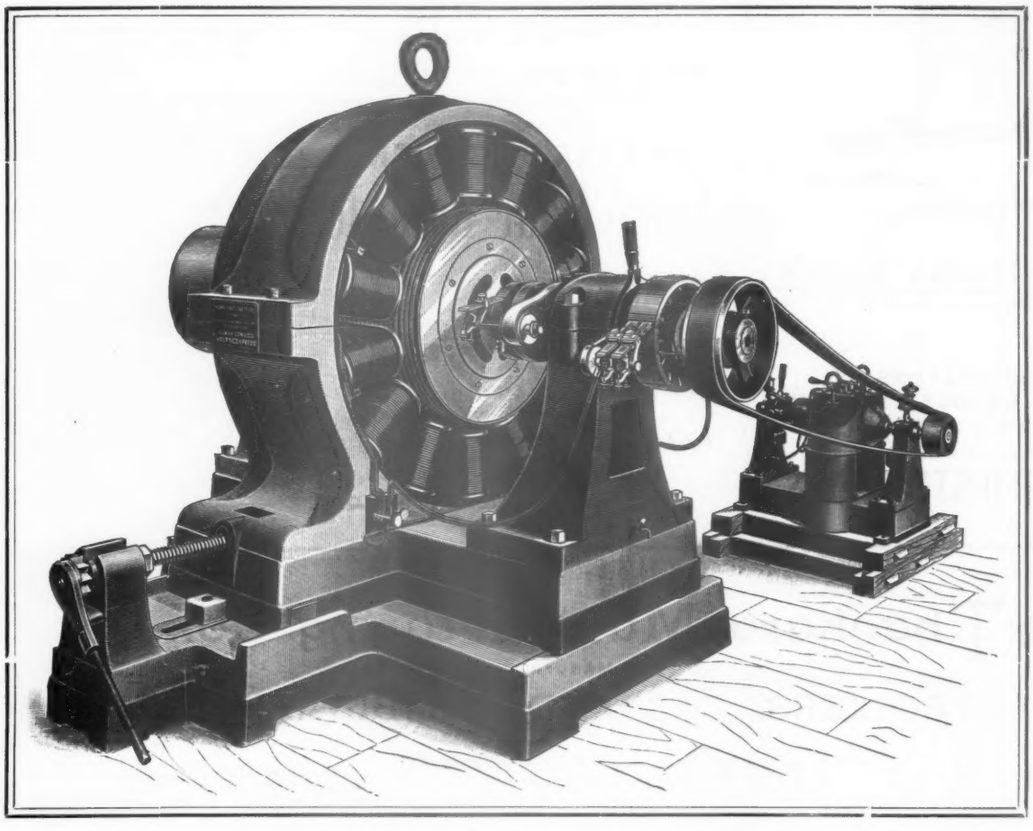

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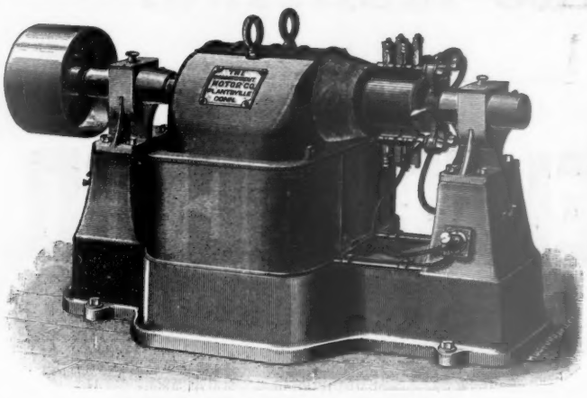

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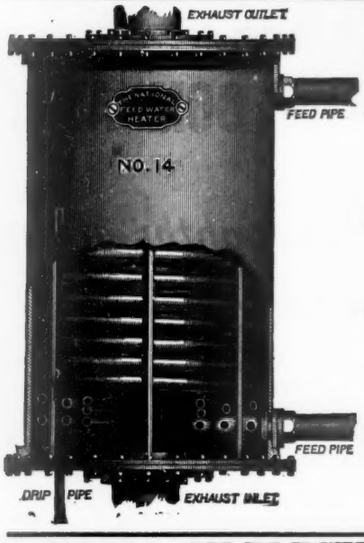

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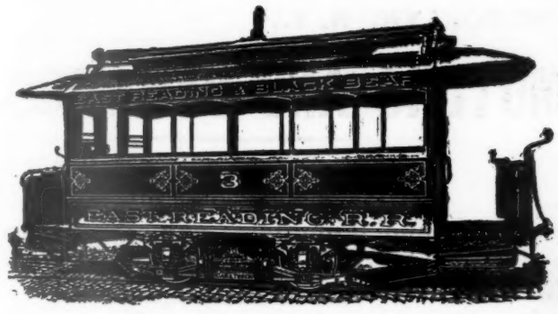

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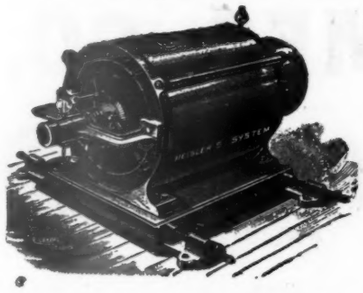

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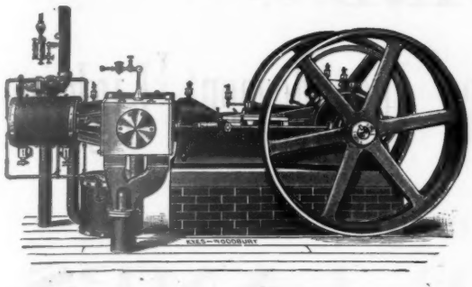

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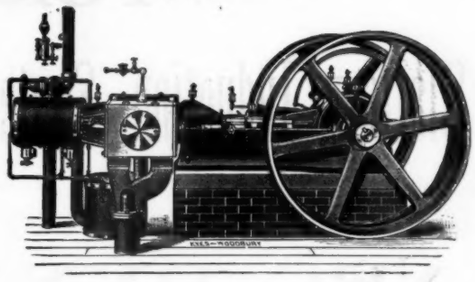

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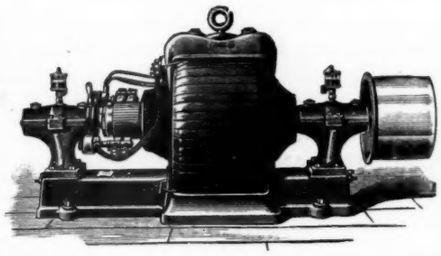

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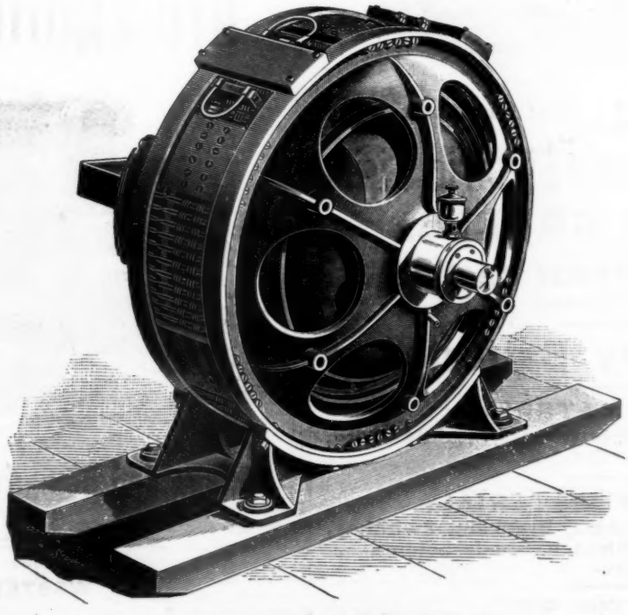

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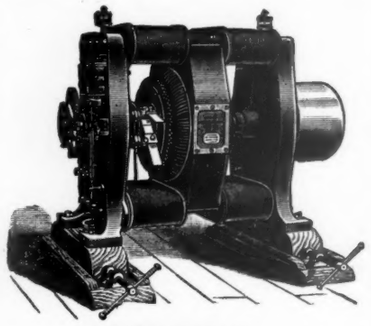

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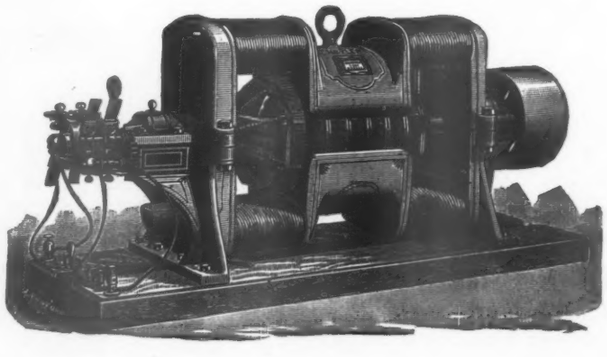

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